# MAINTENANCE MANUAL

*Doc. n° 2002/61*

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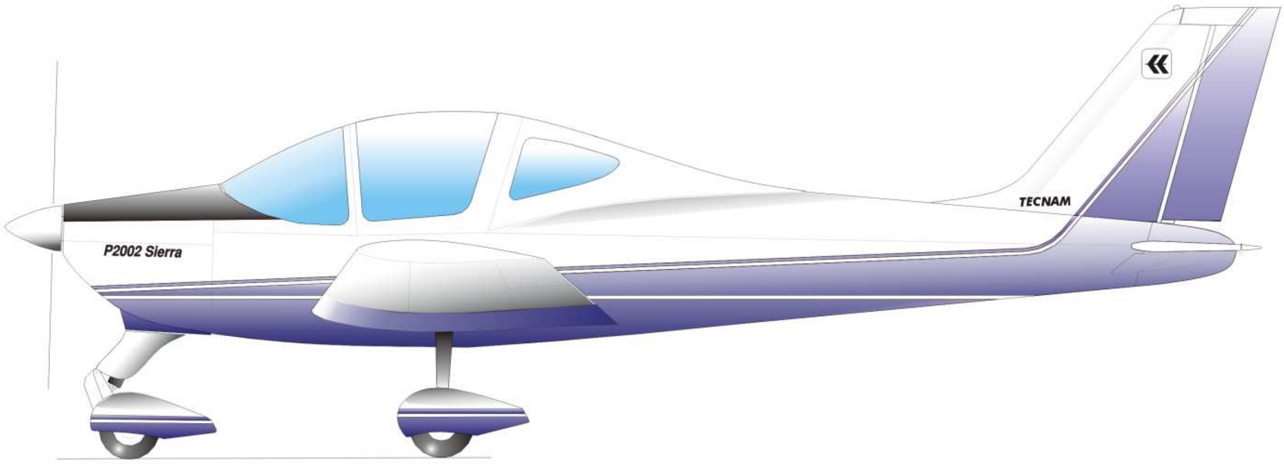
*Revision, 0*




# *P2002 Sierra*

| | |
|---|---|
| BUILD NUMBER | ............ |
| BUILD YEAR | ............ |
| REGISTRATION MARKINGS | ............ |

Before flying the aircraft we recommend careful reading of this manual, the flight manual and the engine's service manual. A thorough knowledge of the aircraft, of its qualities and of its limitations will allow you to operate with greater safety.

The *P2002 Sierra* is an uncomplicated and sturdy machine whose features include simple servicing and superior flying qualities. This manual describes time and modes for correct servicing procedures. Scrupulously following instructions will insure that your *P2002 Sierra* will accompany you dependably for a long time with optimal performance in absolute safety.

This manual consists of 6 sections; a table of contents at the beginning of each section will allow you to reach quickly any selection.

Information contained herein is based on available data at time of publication, possible variations shall be presented in servicing bulletins.

This manual describes correct servicing of parts manufactured by ***TECNAM*** and, in subordinate measure, of the list of components purchased from external suppliers; for more complete information on individual components it is necessary to refer to the component's manufacturer's manual.

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# SECTION A

# GENERAL

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## 1 – DESCRIPTION & GENERAL CHARACTERISTICS

The ***P2002 Sierra*** is a twin seat, single engine, low wing, metal structure monoplane with tricycle landing gear and steerable nose gear.
Figure A-1 shows a Three View drawing of the aircraft while the following table report main technical features and dimensions.

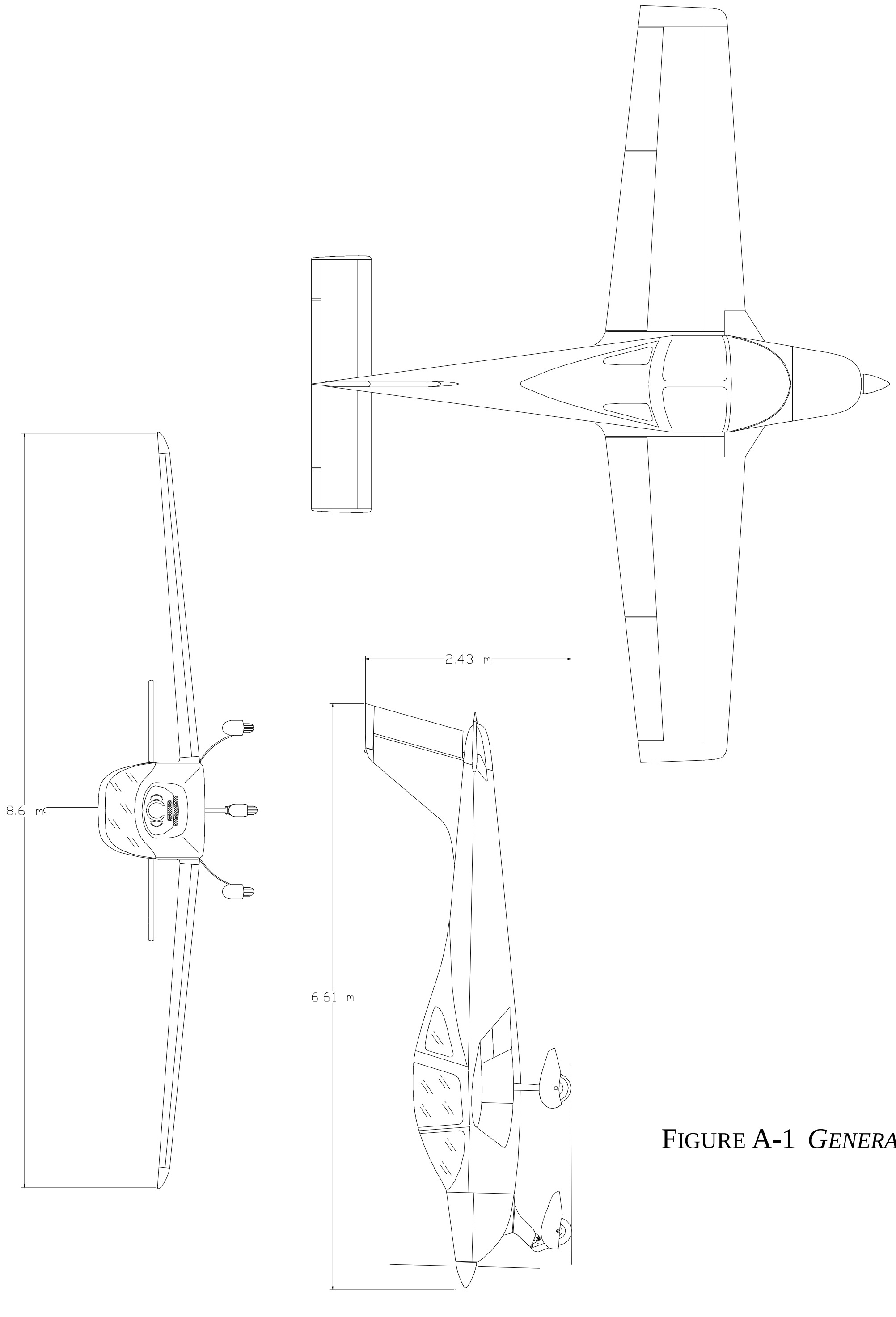


FIGURE A-1 *GENERAL VIEWS*

***PRIMARY DIMENSIONS***

WING

| | |
|---|---|
| Wing span | 8.6 m |
| Wing surface | 11.5 $m^2$ |
| Wing loading | 39 $kg/m^2$ |
| Aspect ratio | 6.4 |
| Taper ratio | 0.6 |
| Dihedral | 5° |

FUSELAGE

| | |
|---|---|
| Length overall | 6.61 m |
| Width overall | 1.11 m |
| Height overall | 2.43 m |

EMPENNAGE

| | |
|---|---|
| Stabilator span | 2.90 m |
| Vertical tail span | 1.10 m |

LANDING GEAR

| | |
|---|---|
| Wheel track | 1.85 m |
| Wheel base | 1.62 m |
| Main wheel tyres: Air Trac | 5.00-5 |
| Nose gear tyre: Sava | 4.00-6 |

CONTROL SURFACE TRAVEL RANGE

| | |
|---|---|
| Ailerons | up 25° down 19 ° ± 2° |
| Stabilator | up 15° down 3° ± 1° |
| Trim | 2° ; 9° ± 1° |
| Rudder | Lh 30° Rh 30° ± 2° |
| Flap | 0°; 40° ± 1° |

***ENGINE***

| | |
|---|---|
| Manufacturer | Bombardier-Rotax GmbH |
| Model | 912 ULS |
| | 4 cylinder horizontally-opposed twins with overall displacement of 1352 c.c., mixed cooling, (water-cooled heads and air-cooled cylinders), twin carburetors, integrated reduction gear with torque damper. |
| Maximum rating | 73.5 kW (98.6 hp) @ 5800 giri/min - max. 5 min. |
| | 69.0 kW (92.5 hp) @ 5500 giri/min - continuous |

***PROPELLER***

| | |
|---|---|
| Manufacturer | F.lli Tonini Giancarlo & Felice S.n.c. |
| Model | GT-2/173/VRR-SRTC FW101 |
| Number of blades | 2 |
| Diameter | 1730 mm |
| Type | Fixed pitch - wood |

## FUEL

| | |
|---|---|
| Fuel grade | • Min. RON 95<br>• EN 228 Premium<br>• EN 228 Premium plus<br>• AVGAS 100LL (see Flight Manual Sec. 2) |
| Fuel tanks | 2 wing tanks integrated within the wing's leading edge with fuel strainer located in engine cowling |
| Capacity of each wing tank | 50 L |
| Total capacity | 100 L |

## Oil System

| | |
|---|---|
| Oil system type | Forced, with external oil reservoir |
| Oil | Lubricant specifications and grade are reported into the "Rotax Operator's Manual" and in its related documents |
| Oil Capacity: | max. 3.0 litres – min 2.0 litres |

## COOLING

| | |
|---|---|
| Cooling system: | Mixed air and liquid pressurized closed circuit system |
| Coolant: | Coolant type and specifications are reported into the "Rotax Operator's Manual" and in its related documents. |

### MAXIMUM WEIGHTS

| | |
|---|---|
| Maximum Takeoff weight | 450 kg |
| Maximum Landing weight | 450 kg |

### STANDARD WEIGHT

| | |
|---|---|
| Standard empty weight | 289 kg |

### SPECIFIC LOADINGS

| | |
|---|---|
| Wing loading | 39 $kg/m^2$ |
| Power loading | 4.6 kg/hp |

# SECTION B

# INSPECTION & SERVICING

TABLE OF CONTENTS

## 1 GROUND HANDLING

Move the aircraft on ground by pulling on the propeller blades close to hub. A tow bar can be attached to fittings. Aircraft can be steered using the rudder or, for sharp turns, by lowering the tail to raise nosewheel off the ground. In this case, owing to the favorable CG location, a gentle push on the tailcone just ahead of empennage surfaces is all that is needed. Avoid dragging nosewheel sideways and do not attempt to counter any movement of the aircraft by handling it by its wing tips.

## 2 PARKING AND TIE-DOWN

As a general precaution for outdoor parking, it is wise to position aircraft into the wind and to set the parking brakes or chock the wheels if chocks are available.

In severe weather and high wind conditions, aircraft tie-down is recommended. Tie ropes should be secured to the wing tie-down fittings located under each wing. Secure opposite end of ropes to ground anchors. Nose gear fork may be used as fixing for forward tie-down.

Aircraft control stick should be locked using safety belts to prevent possible weathervaning damage to control surfaces.

## 3 JACKING

For the jacking of the main landing gear, two lifting points are provided under the two outer keelsons (see Figure B-1). The lifting point consists of a small aluminium cylinder fastened to the outer keelsons. Below of it could be placed either a hydraulic jack or a lifting rod. The lifting point is realized with a $\phi$11mm hole which could be used to fit a lifting rod safety pivot. Given the light empty weight of the aircraft, lifting one of the main wheels can be easily accomplished even without the use of hydraulic jacks.

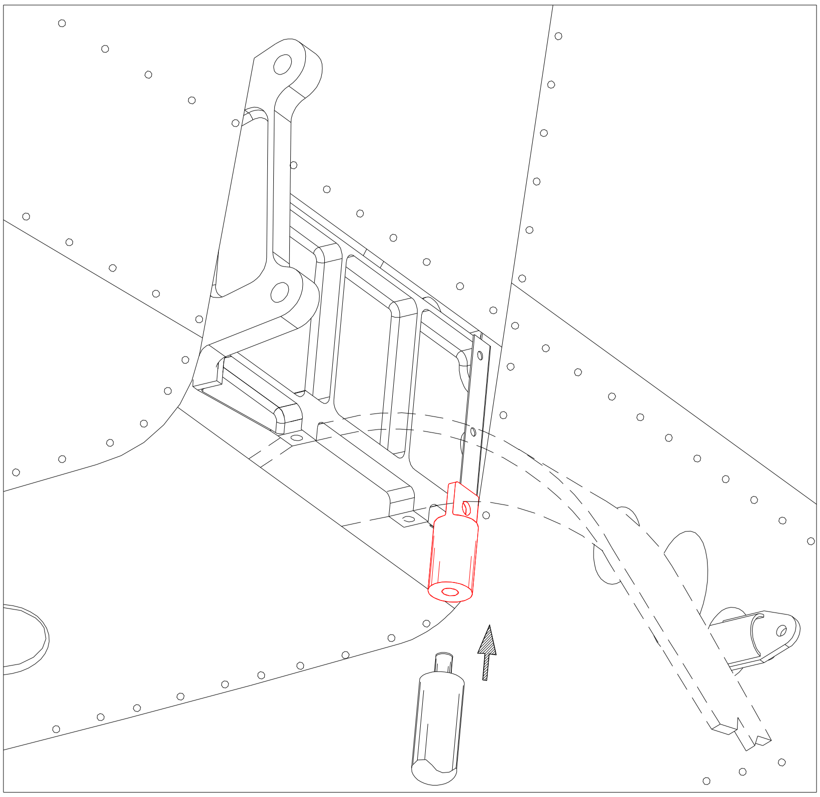

FIGURE B-1 *REAR LIFTING POINT*

In case of it would be necessary to lift the nose gear, we suggest you to remove the engine's cowling and then, acting on the engine's mount, lift the aeroplane.

**WARNING**

*As general rule, apply force to aircraft structure only on main structural elements such as frames, ribs or spars.*

# 4 LEVELLING

Occasional levelling of aircraft may be necessary to insure proper wing incidence and/or dihedral or for exact CG location.

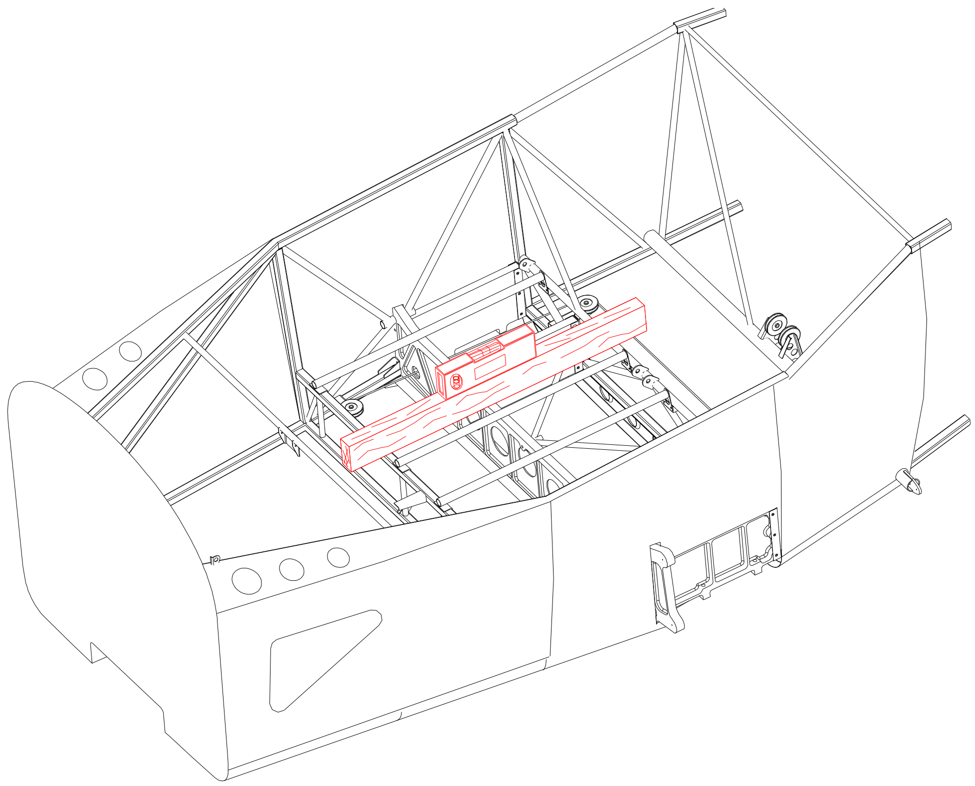

FIGURE B-2 *LONGITUDINAL LEVELLING*

## 4.1 LONGITUDINAL LEVELLING

To check the longitudinal levelling act as follows:

- Slide off one of the two seat to get the access to the two seat track's supporting trusses.
- Place longitudinally a spirit or water level over the two supporting trusses using, if necessary, a straight piece of wood as indicated into figure B-2.
- Adjust the aircraft's tilt through shims placed under wheels or by regulating tire pressure.

## 4.2 TRANSVERSAL LEVELLING

With one seat removed place a level along the forward seat track's supporting truss. Level the aeroplane by deflating the main gear tyres.

# 5 MOVING SURFACES CONTROL SETTINGS

Adjustment of control surfaces must not exceed travel limits reported in table below.

| | | | |
|---|---|---|---|
| *AILERONS (starting from tip line-up)* | up 25° | dwn 19° | ± 1° |
| *STABILATOR* | up 15° | dwn 3° | ± 1° |
| *TRIM ( Stab. at 0°, see picture below)* | 2° | 9° | ± 1° |
| *RUDDER* | Lh 30° | Rh 30° | ± 2° |
| *FLAPS ( max. travel )* | 0° | 40° | ± 1° |
| *CONTROL CABLE TENSION (for all)* | | 20 daN | ± 2 daN |

## 5.1 STABILATOR SETTING

In order to find the stabilator's "zero" the aeroplane must be previously longitudinally levelled. Place a shim 19mm thick over the stabilator's rear spar and place the level over the shim and the stabilator's tubular spar (see figure B-3), then level the stabilator.

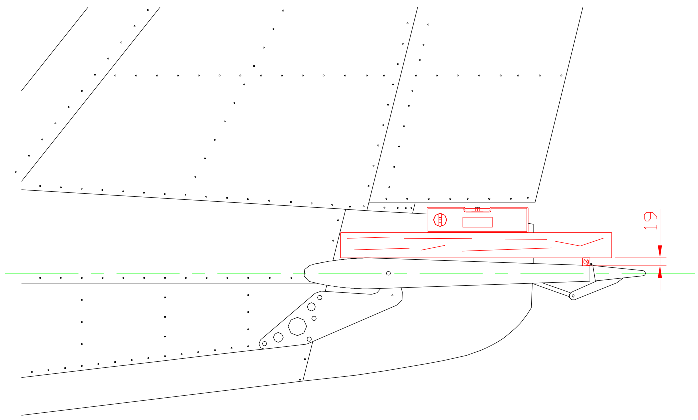


FIGURE B-3 *STABILATOR SETTING*

## 5.2 TRIM-TAB ADJUSTMENT

The following procedure lists the operation to be carried out to adjust the trim tab excursion:

- Set the stabilator in its "zero" position and lock it in this position.
- Turn the Master switch ON.
- Trim to maximum pitch-up;
- Adjust thread of hinged control rod until tab is deflected downwards 9° (use a protractor or measure downward displacement of trailing edge - 9° is approximately 16mm);
- Tighten lock-nut for adjustment thread and fasten connecting pin of control rod to trim-tab.

# 6 AIRCRAFT ALIGNMENTS

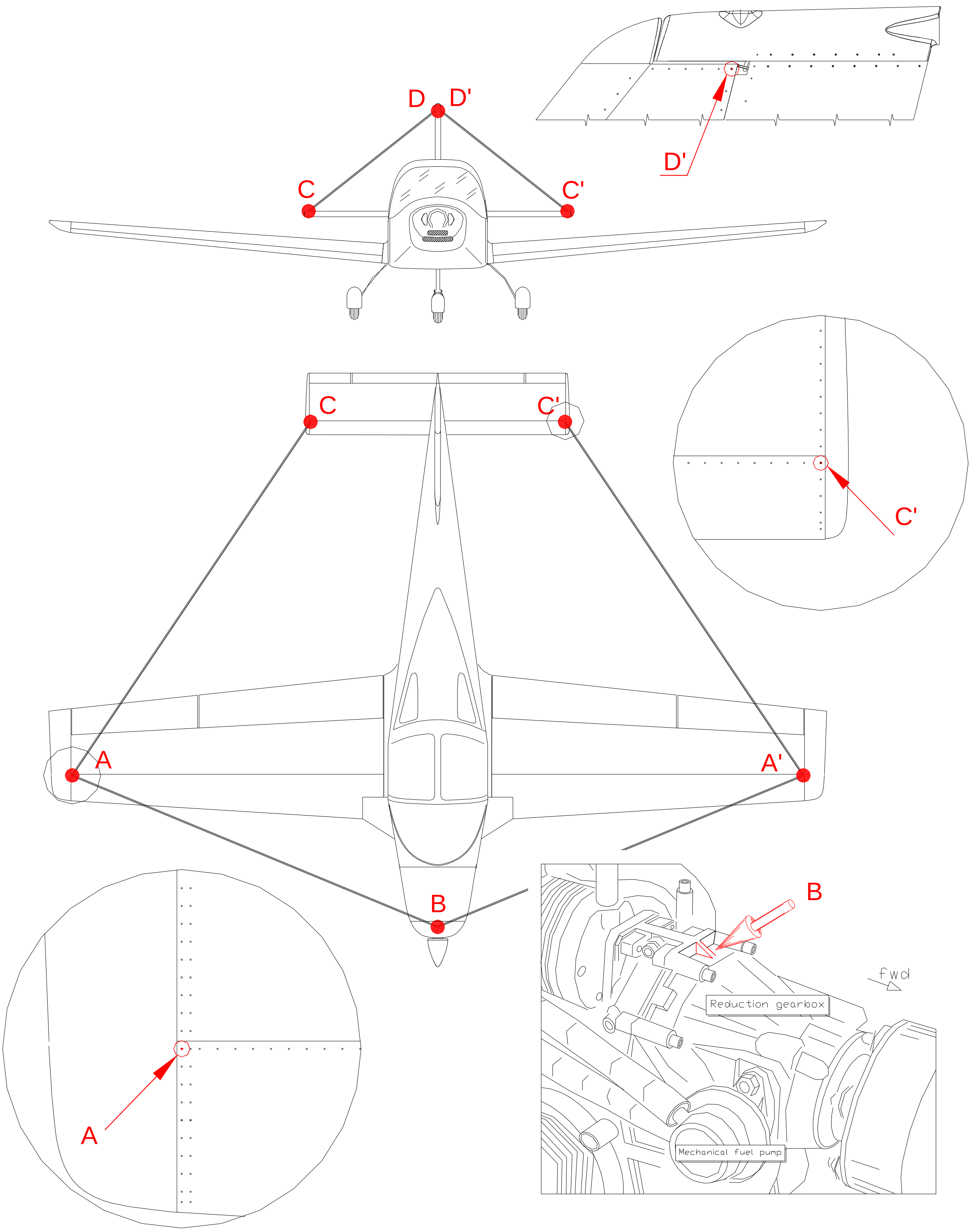


FIGURE B-4 ALIGNMENTS

## 6.1 DATUM

- A & A' – On the wing upper surface, is the rivet shared between the main spar's and the composite wing tip rivet lines (of the two tip rivet lines, we are referring to the external one).
- B – The reference pointed in Figure B-4 on the top of the propeller reduction gearbox. To get the access it is necessary to remove the engine's upper cowling.
- C & C' – On the stabilator upper surface, is the rivet shared between the composite tip and the tubular spar rivet lines.
- D & D' – On the fin's skin is the upper/aft rivet. It shared between the upper rib and the rear spar rivet lines.

## 6.2 NOMINAL DISTANCES

The aim of the alignment control is mainly to compare the measures taken on both sides and to check if the difference between them, if any, is within the tolerances reported below.

| Datum | Nominal distances (mm) |
|---|---|
| A - B | 4360 ± 20 |
| A'- B | 4360 ± 20 |
| A - C | 4685 ± 20 |
| A'- C' | 4685 ± 20 |
| C - D | 1810 ± 10 |
| C'- D' | 1810 ± 10 |

# 7 WEIGHING AND DETERMINATION OF VERTICAL CG

USE GUIDELINES AS FOLLOWS:

a. Carry out weighing procedure inside hangar
b. Remove any unnecessary objects inadvertently left on board aircraft
c. Make sure of the on-board presence of the Flight Manual.
d. Align nose wheel
e. Drain fuel
f. Oil, hydraulic fluids and coolants at operating levels
g. Move seats to most forward position
h. Flaps retracted (0°)
i. Control surfaces in neutral position
j. Position scales (min. capacity. 200 kg) under each tire

LEVELLING

a. Level the aircraft (see par.4 “Levelling”)

WEIGHING

a. Record weights of individual scales
b. Calculate empty weight

DETERMINATION OF CG

a. Drop a plumb bob tangent to the wing’s leading edge, as indicated into figure B-5. Trace a reference mark on floor.
b. Repeat operation on other wing.
c. Connect the two reference marks with a taut line
d. Measure distances between reference line and landing gear wheel axles
e. Recorded data allows determination of C.G. location and aircraft’s moment (see following table)

# WEIGHT AND CG DETERMINATION TABLE

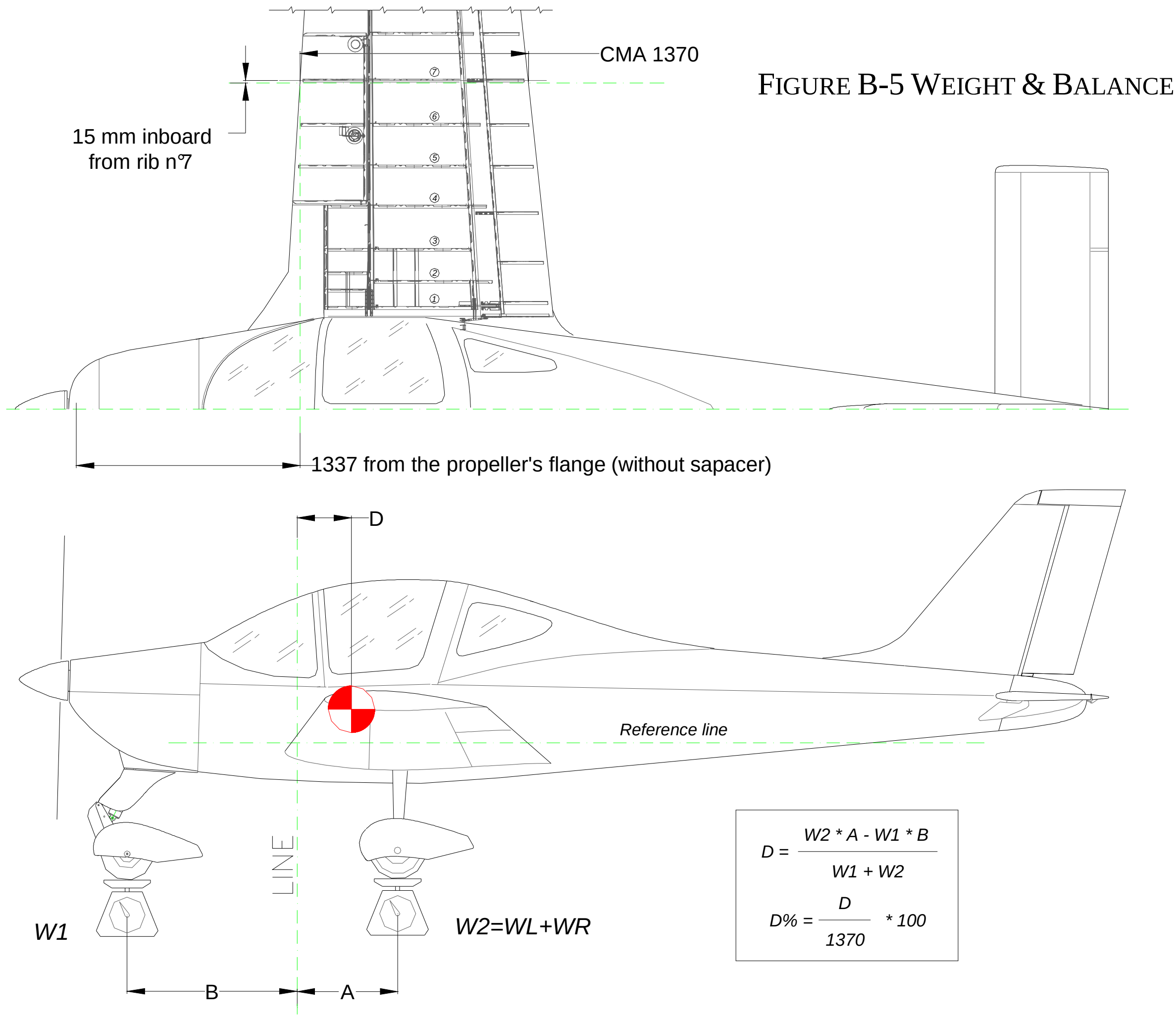


FIGURE B-5 WEIGHT & BALANCE

| | *Kg* |
|---|---|
| Fwd wheel weight | **$W_1$ =** |
| Lh main " " | **$W_L$ =** |
| Rh main " " | **$W_R$ =** |
| $W_2$=$W_L$+$W_R$= | |

| | *metres* |
|---|---|
| Distance from bob to Lh wheel | **$A_L$ =** |
| " " Rh wheel | **$A_R$ =** |
| Average distance ($A_L$+ $A_R$)/2 | **A =** |
| Distance from bob to nose wheel | **B =** |

| | |
|---|---|
| *Empty weight* ➔ $W_e = W_1 + W_2$ = | $D = \frac{W_2 \cdot A - W_1 \cdot B}{We}$ =________*meters* |
| *C.G. position as wing chord %* | *D% = D/1.37 · 100 =* |

## 8 CORROSION PREVENTION

It is important to keep the aircraft clean and to remove any collection of corrosive agents such as oil, grease, dregs and other foreign matter. To avoid damage to finish, do not use polishing detergents.

Original or equivalent corrosion prevention must be re-applied after any alteration or repair.

If any trace of corrosion is detected it should be removed as soon as possible and part should be immediately treated to prevent further corrosion.

**(a) <u>For steel parts</u>,** with the exception of highly stressed components or stainless steel, it is possible to use abrasives, power brushes, steel brushes if operated manually and steel wool.

Removing corrosion by products from highly stressed steel components (main gear steel spring) requires particular care.

**(b) <u>For aluminum parts</u>,** treatment consists in mechanically removing as much as possible corrosion by products, applying corrosion inhibitor and replacing original finish.

Steel wool, emery or steel brushes (unless stainless steel) along with other highly abrasive material should not be used since steel or emery particles become embedded in the softer material causing corrosion.

After cleaning surface corrosion, parts must be treated with an anti-corrosion finish prepared as follows: 4 liter solution containing 10% cromic acid with  20 drops of battery electrolyte. Accurate brushing with a sturdy fiber brush will rid of most of the corrosion and insure that the anti-corrosion agent will penetrate completely in the cracks.

Leave the cromic acid solution on the part for at least five minutes and then remove excess with water or a damp cloth. Apply protective finish the same day in which treatment begins.

## 9 SERVICE BULLETINS

| NO. | DESCRIPTION | CL(#) | N/C | VALIDITY |
|---|---|---|---|---|
| | | | | |
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# O Optional
P Prescribed
R Recommended
F Voluntary

## *10* SERVICING.

*Daily*

**1** - ***Pitot and static ports*** – Check for obstructions. (see sect. E, Pitot & static system);

**2** - ***Oil*** – Check oil level in reservoir located on the firewall (see: *Maintenance Manual* of the ROTAX 912ULS);

**3 -** ***Coolant*** **–** Check coolant level in the expansion tank located at the top of the engine;

**4** - ***Fuel strainer*** – Drain off any water and sediment by opening drain valve and collecting an amount of fuel at lest equal to cup’s capacity.

**5** - ***Fuel tank vents*** – Check vents for obstruction.(see sect. E, Fuel system)

*Every 100 hours*

**7** - ***Battery*** – Check electrolyte level.

**8** - ***Fuel filter*** – Remove and clean the fuel filter built in the electric pump.

**9** - ***Engine oil*** – Replace oil and filter (see ROTAX 912ULS *Maintenance Manual*) initially after the first 25 hours.

**10 –** ***Brake fluid*** – Check level of brake fluid in the master cylinder located below the left seat. Add fluid as needed using MIL H5606 type UNIVIS J43.

**11** – ***Carburettor air filter/s*** – Check filter/s and clean. Repeat operation more often if operating in dusty conditions.

**12 - Gyro instrumentation** *(if installed)* – In case of incorrect readings of vacum system, clean or replace central filter and, if needed, adjust vacum valve.

**13** - ***Airspeed system drain*** – Slide off the left seat, disconnect the hose fittings and let drain the system

*As needed*

**14** - ***Tyres*** **–** Check condition and maintain proper tyre pressure.

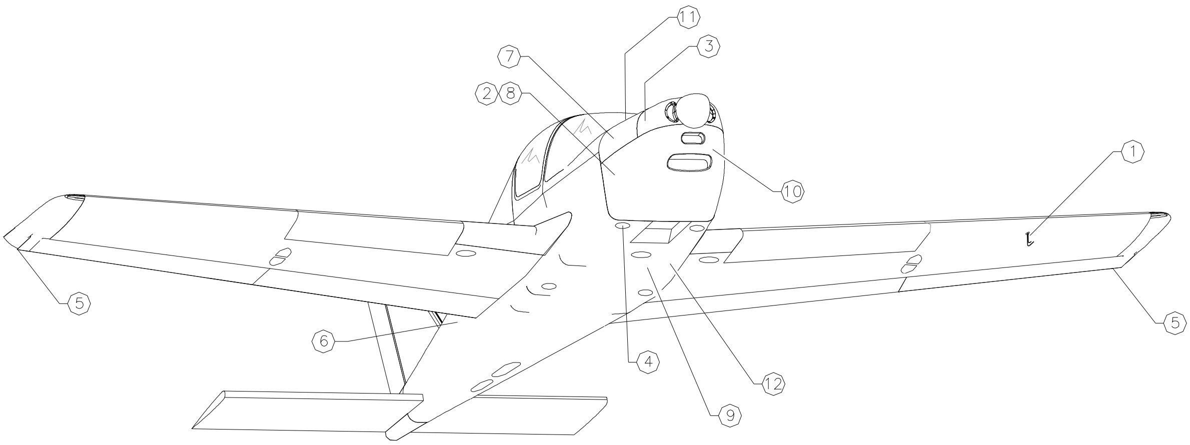


FIGURE B-6 INSPECTION POINTS

# 11 LUBRICATION

## 11.1 INTRODUCTION

Periodic lubrication of moving parts insures proper operation and extends parts' life considerably.

Lubrication type, points and intervals are indicated below.

Avoid excessive lubrication as this may cause external surfaces of hinges and bearing to collect dirt and dust.

If part is not lubricated using a grease gun, grease part by hand removing excess.

To grease main gear wheel bearings, first remove thrust bearings from wheel hubs, then clean surface using solvent, apply grease and reassemble.

NOTE - *Use grease type MIL-G-3278 or equivalent (e.g. ESSO BEACON 325).*

## 11.2 LUBRICATION POINTS (SEE FIG. B-7 & B-8)

| | |
|---|---|
| *1-2* | Rudder hinges |
| *3-4* | Rudder control cable terminals |
| *5* | Stabilator control rod terminals |
| *6-7* | Stabilator support bearings |
| *8-9* | Trim-tab hinges |
| *10* | Tab control push-rod terminals |
| *11* | Stabilator pass-through rod |
| *12* | Stabilator control rod (inside cabin) |
| *13-14* | Aileron hinges |
| *15* | Differential ailerons hinges |
| *16* | Aileron control pushrods |
| *17* | Aileron control rods pass-trough |
| *18* | Flaps control pushrods |
| *19-20* | Flaps torque-tube support |
| *21* | Flap actuator terminals |
| *22-23* | Rudder pedals support |
| *24-25* | Rudder pushrods and cable terminals |
| *26-27* | Brake lever support |
| *28-29* | Control stick lever and support |
| *30-31* | Aileron control pulleys |
| *32* | Nose gear fork attachment hinge |
| *33* | Shock absorber attachment hinge |
| *34* | Nose gear strut attachment hinge |
| *35* | Steering pushrod terminals |

Grease canopy's ball bearings and adjustable seat rails when necessary.

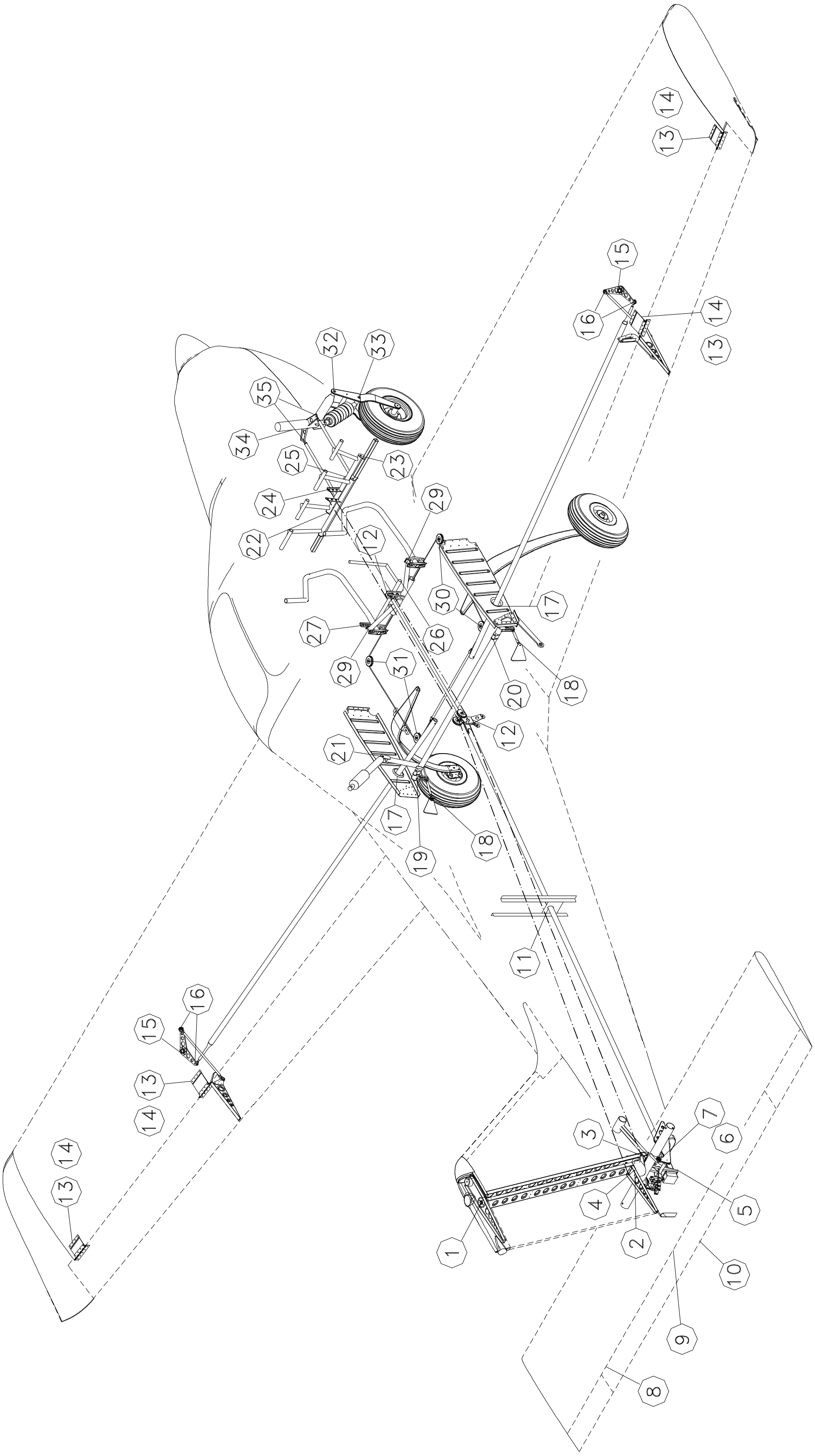


FIGURE B-7 *LUBRICATION POINTS*

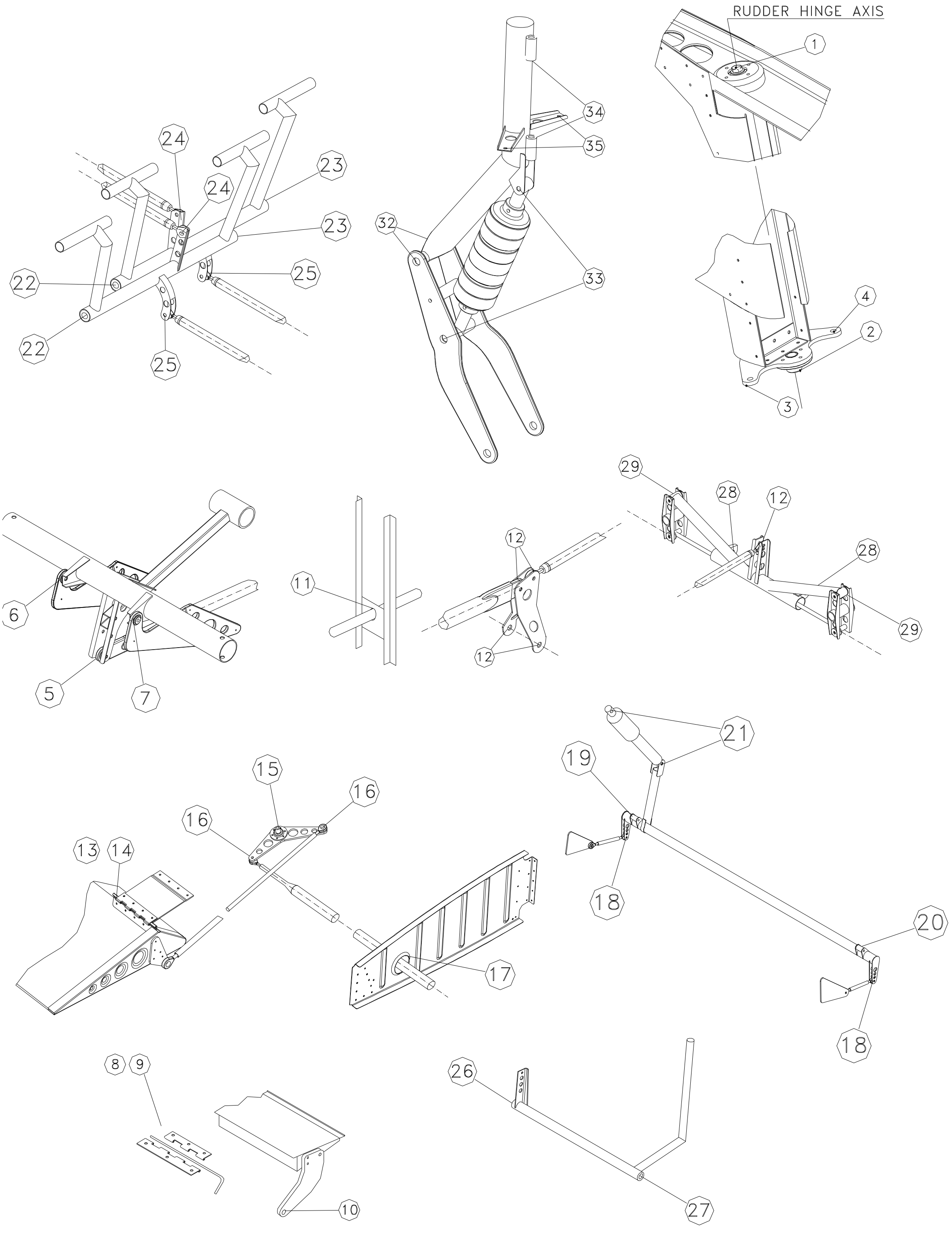


FIGURE B-8 *LUBRICATION EVERY 100 HOURS*

## 12 INSPECTION

Inspection points that are not in plain view may be accessed through specific portholes and/or removal of panels or fairings as detailed below:

1 - **Portholes on wing underside** - access to aileron differential bellcrank, main spar and torque box; inspection of the wing tank outlet.

2 - **Tailcone underside portholes** - access to: stabilator control rod pass-through; front attachment of vertical stabilizer; inspection of aft structure and of cables for rudder control.

3 - **Tailcone end-fairing** - access to stabilator torque tube and attachments to control lever; -attachment of vertical stabilizer aft spar; -rudder bellcrank; -trim actuator and pushrods.

4 - **Aft cabin bulkhead and baggage compartment floor** - inspection of aft fuselage section and attachments; -inspection of stabilator control system and of cable pulleys for rudder control; - access to flap actuator; Remove the seats to get the access to the aileron control cable turnbuckles.

5 - **Forward cabin central fairing** - access to the fuel valves and to the rudder control cables and turnbuckles.

6 - **Instrument panel cover** - access to instrumentation and radio.

7 - **Engine cowling** - access to engine and related systems; - access to main components of electrical system - access to nose gear strut and steering assembly mechanism.

8 - **Propeller spinner** - access to propeller hub.

# 13 INSPECTION

## 13.1 INTRODUCTION

- TECNAM considers inspection schedule outlined below compulsory for the operational safety of the airframe and of the systems over an extended period of time. Described servicing requirements pertain to operation in non-extreme climatic conditions.
- For the Rotax 912ULS engine, unless otherwise stated in the present Manual, it is compulsory to adhere to maintenance requirements as reported in the Engine Maintenance Manual furnished by the engine's manufacturer (p/n 899372 Issue 0 of 1/9/1998 and later versions).
- For the Tonini propeller, please refer to its Maintenance Manual
- Airframe and systems inspection schedule is as follows:
  - A. Inspections for airworthiness before first flight of day as specified in Flight Manual.
  - B. Periodic inspections at every 100 hours.
  - C. Special inspections, added to normal periodic.
  - D. Singular inspection, when aircraft has been exposed to fortuitous events that may have damaged one or more of its components.

  *If aircraft is rarely used, inspection at 100 hours must be performed yearly.*

* Replacement of parts subject to usage limitations are specified in par. 14.2

* Inspections and checks, unless specifically indicated, apply to the following

STRUCTURES IN GENERAL - Condition of panel covers, ribs, frames, stringers etc., absence of cracks, deformation, rivet slackening, corrosion and any other apparent sign of damage.

MOVING PARTS - Lubrication, security of attachment, safetying of bolts, absence of excessive play, proper adjustment, proper travel, condition of attachments and hinges, absence of corrosion, deformation, rivet slackening, cleanliness.

FLUID LINES AND HOSES - Absence of leaks, cracks, dents, chafing, proper radius, deterioration.

BOLTS AND ATTACHMENTS - Proper tightening and safetying, absence of cracks or nicks, damage to thread, wear and excessive play.

## 13.2 PERIODIC INSPECTIONS

The first column in the following table describes the type of inspections to be carried out “Nature of Inspection”; the second column, divided in three parts, shows the “Inspection Intervals”. The symbol “●” marks the relative inspection interval: 100 hours and the prospective interval for a special inspection.
Every porthole, fairing, panel etc. shall be removed to allow for inspection.
Procedures explained in SERVICING (Chap. 10) are included in the inspections.
Instructions for actions following inspection are detailed in specific sections pertaining to the aircraft group or system.
It is suitable to use TECNAM-prepared inspection checklists.

## 13.3 SERVICING REQUIREMENTS

| | *NATURE OF INSPECTION* | *INSPECTION INTERVALS (HRS)* | |
|---|---|---|---|
| | | **100** | Special |
| | **ENGINE COMPARTMENT** | | |
| 1 | Remove cowling and check for fuel, oil and coolant leaks; clean engine compartment | ● | |
| 2 | Visually inspect electric pump connections | ● | |
| 3 | Visually inspect engine mount and silent-blocks attachments | ● | |
| 4 | Visually inspect exhaust manifold, muffler and heat exchanger | ● | |
| 5 | Visually inspect air intake and carburetor feed circuit | ● | |
| 6 | Visually inspect coolant reservoir, radiator and circuit line | ● | |
| 7 | Visually inspect oil reservoir, radiator and circuit line | ● | |
| 8 | Check wires and electrical connections (low and high tension) | ● | |
| 9 | Check carburetor control and throttle movement | ● | |
| 10 | Clean electric fuel pump filter | ● | |
| 11 | Check density of battery electrolyte | ● | (a) |
| | | | |

(a) Every 100h or more frequently in warm climate.

| NATURE OF INSPECTIONS | | INSPECTION INTERVALS (HRS) | |
|---|---|---|---|
| | | **100** | Special |
| **FUEL SYSTEM** | | | |
| 1 | Check circuit lines for integrity and wetness | ● | |
| 2 | Check shutoff valves | ● | |
| 3 | Rinse tanks and clean exit filters | | 1200 |
| | | | |
| **FLIGHT CONTROLS** | | | |
| 1 | Check cables, terminals, pulleys and turnbuckles for integrity and proper condition of aileron and rudder control | ● | |
| 2 | Check pushrod terminals, lever hinge bushings, stabilator control pass-through | ● | |
| 3 | Check pushrod terminals and aileron control pass-through | ● | |
| 4 | Check flaps pushrod terminals | ● | |
| 5 | Check flaps actuator for integrity and play, attachment of terminals and electrical connections | | 600 |
| 6 | Check torque tube, levers and attachments for flaps control | ● | |
| 7 | Check resin control lever for trim actuator | | 600 |
| 8 | Check trim control levers and pushrods for integrity and play | ● | |
| 9 | Check rudder pedals for integrity and play | ● | |
| 10 | Check control stick group for integrity and play | ● | |
| 11 | General check for proper tension level for control cables | | 600 |
| | | | |
| **MOVING SURFACES** | | | |
| 1 | Visually inspect integrity of the stabilator's dacron wrap-around (if installed) for cracks, chinks, etc. | ● | |
| 2 | Visually inspect and check integrity of wrap-around paneling for rudder and flaps. | ● | |
| 3 | Check integrity and play of flaps and aileron hinges | ● | |
| 4 | Check integrity and play of stabilator attachments | ● | |
| 5 | Check integrity and play of trim-tab hinges | ● | |
| 6 | Check play and proper fastening of stabilator tubular spar | ● | |
| 7 | Check integrity of balance weight support | ● | |
| 8 | Check integrity and play of rudder lever and hinges | ● | |

| | NATURE OF INSPECTIONS | ISPEZIONE INTERVALS (HR) | |
|---|---|---|---|
| | | **100** | Special |
| | **WING** | | |
| 1 | Visually check general condition of wrap-around skin and rivets | ● | |
| 2 | Disconnect wings from fuselage and check condition of attachments and for possible play | | 1200 |
| 3 | Check condition of spar and wing structure through dedicated openings | | 600 |
| 4 | Check integrity of stall warning unit (if installed) | ● | |
| | | | |
| | **FUSELAGE and EMPENNAGES** | | |
| 1 | Visually check general condition of wrap-around skin and rivets | ● | |
| 2 | Inspect cabin truss for deformations and corrosion | | 600 |
| 3 | Check seat rails and stops and safety belt attachments | ● | |
| 4 | Check internal condition of tailcone structure | | 600 |
| 5 | Check attachment between vertical stabilizer and tail beam | | 600 |
| 6 | Check integrity and fastening of stabilizer support assy | | 600 |
| 7 | Check integrity and general condition of transparent surfaces and canopy | ● | |
| 8 | Check canopy rails and ball bearings for smooth movements | ● | |
| 9 | Check electric circuit wiring and antennae attachments from inside of tailcone | | 600 |
| 10 | Visually check the Wing Carry-Through beam and wing's attachments. | | 600 |
| | | | |
| | **MAIN LANDING GEAR** | | |
| 1 | Check brake system (reservoir, master cylinder, lines and calipers) | ● | |
| 2 | Replace brake pads | | 600(a) |
| 3 | Visually check steel spring struts, connection clamp and fastening of bolts | ● | |
| 4 | Remove legs and check for proper curvature and integrity | | 1200 |
| 5 | Inspect main wheels for condition and fastening | ● | |
| 6 | Remove wheels, clean and grease wheel bearings | | 600(b) |
| 7 | Check fairing integrity and attachments | ● | |
| | | | |

(a) when brake pad thickness is below 2.4 mm
(b) initially at 100 hours

| | *NATURE OF INSPECTIONS* | *INSPECTION INTERVALS (HR)* 100 | Special |
|---|---|---|---|
| ***I*** | **NOSE GEAR** | | |
| 1 | Inspect support truss for gear strut and attachment hinges | ● | |
| 2 | Check proper movement of steering levers and pushrods | ● | |
| 3 | Check integrity and play of strut-to-fork hinge attachment | | 600 |
| 4 | Check shock hinge attachments | | 600 |
| 5 | Check shock for general condition and state of rubber disks | ● | |
| 6 | Inspect wheel for condition and fastening | ● | |
| 7 | Remove wheel, clean and grease wheel bearings | | 600(c) |
| 8 | Remove nose gear assy for general safety check and inspection | | 1200 |
| 9 | Check integrity of fairing and fairing attachments | ● | |
| | | | |
| ***L*** | **INSTRUMENT PANEL** | | |
| 1 | General inspection of operation of flight and engine instruments | ● | |
| 2 | Check acoustic stall warning (if installed) | ● | |
| 3 | Check compass alignment | | 48 months |
| 4 | Check calibration of airspeed indicator and altimeter | | 1200 |
| 5 | Check operation of avionic instrumentation (if installed) | ● | |
| 6 | Check operation of switches and fuses/breakers | ● | |
| 7 | Check generator charge | ● | |
| | | | |

(c) initially at 100 hours.

## REFERENCE MEASUREMENTS SUMMARY

TIGHTENING MOMENT FOR ATTACHMENT BOLTS AS A FUNCTION OF SHANK DIAMETER

BOLT Class of resistance 8.8

TIGHTENING MOMENT FOR "UNI" ATTACHMENT BOLTS

| | | |
|---|---|---|
| ∅ 4 | = 3.1 Nm | |
| ∅ 6 | = 10.4 Nm | |
| ∅ 8 | = 24.6 Nm | |

*Attention: bolts connecting propeller to support flange albeit ∅8 must be tightened to 18 Nm.*

TIGHTENING MOMENT FOR "AN" ATTACHMENT BOLTS

| | | MIN | | MAX |
|---|---|---|---|---|
| ∅ 6.35 | = | 9 Nm | = | 10 Nm |
| ∅ 7.94 | = | 11 Nm | = | 16 Nm |
| ∅ 9.52 | = | 18 Nm | = | 22 Nm |

CONTROL CABLES TENSION (FOR AILERON AND RUDDER )

VALUE : 20 dN ± 2 dN

| | | |
|---|---|---|
| TIRE PRESSURE | NOSE | 15 PSI (1.0 BAR) |
| | MAIN | 23 PSI (1.6 BAR) |

CONTROL SURFACES TRAVEL

| | |
|---|---|
| Ailerons | Up 18°down 15° ±2° |
| Stabilator | Up 15°down 4° ±1° |
| Trim | 2° 12° ±1° |
| Rudder | RH 25° LH 25° ±2° |
| Flap | 0° -35° ±2° |

# SECTION C

# AIRFRAME

TABLE OF CONTENTS

# INTRODUCTION

The airframe consists of the following main groups as shown in figure C-1:

1) WINGS
2) FUSELAGE
3) EMPENNAGE
4) LANDING GEAR
5) POWERPLANT

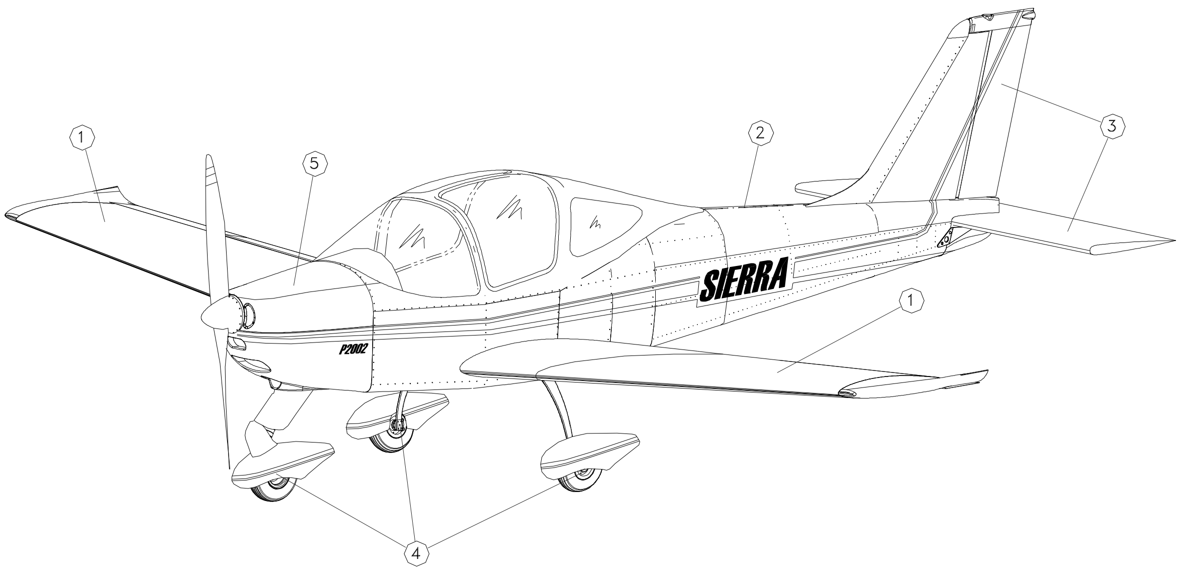


FIGURE C-1 *MAIN GROUPS*

## 1. WING

Each wing is connected to the fuselage by means of three pin attachments.

Wings are made up of a central light alloy torsion box (1); a light alloy leading edge (2) is attached to the front spar (5), while flap (3) and aileron (4) are attached to rear fake spar (6) through two hinges each.

The torsion box, as shown in figure C-2 and with reference to numbers in parenthesis, consists of a main spar (5) and a fake spar (6) that make up its front and rear vertical walls; A series of ribs (7) and wrap-around panels complete the structure. Front and aft spars are complete with wing-to-fuselage attachment fittings (8). Aileron uses "piano-hinges" type MS 20001-4 for direct attachment of aileron spar to wing spar. Flap hinges are external to wing torsion box and feature SKF GE10E type ball bearings.

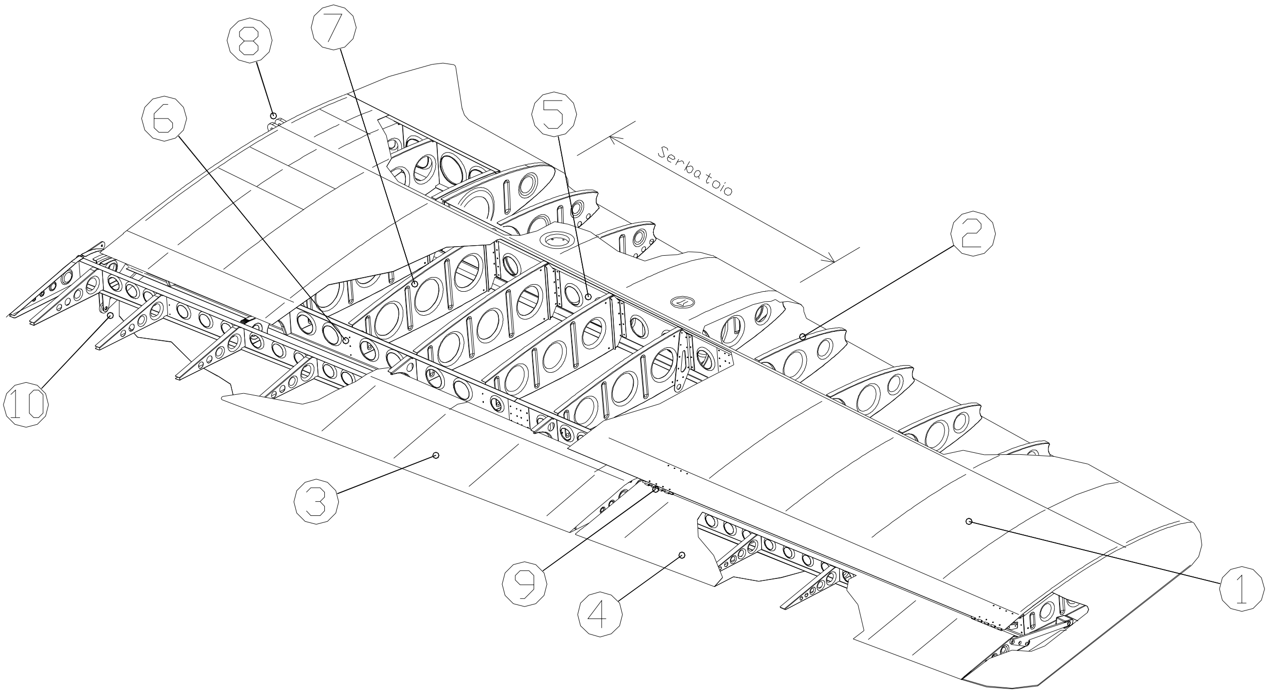


FIGURE C-2 *RIGHT WING STRUCTURE*

The aileron is constructed of an aluminium spar to which a formed sheet metal skin and metal ribs are attached. Flaps are constructed of a centre spar to which front and rear ribs are joined; aluminium skin panels wrap-around flap structure.

Wing tips are moulded epoxy resin, fibreglass reinforced. At the inboard end of the wing's leading edge is an integrated aluminium fuel tank with individual filler cap.

Fuel tanks vent through tubes exhausting in the wing tip trailing edge.

## 2. RIGGING AND DE-RIGGING OF WING

**A.** Drain fuel tank using drain tank and closing opposite side tank fuel circuit.

**B.** Remove the wing’s composite root-leading edge.

**C.** Remove all of the wing to fuselage fairings.

**D.** Remove the fuel tank outlet inspection panel. Unfasten and remove the fuel hose from the tank’s outlet. Place temporary a cap on line to prevent spillage. Only for the left wing, disconnect also the fuel return line.

**E.** For the right wing, disconnect stall-warning system wires (if installed).

**F.** Disconnect the fuel quantity sensor wiring and, if present, the position lights wiring.

**G.** Disconnect flap control (see fig. C-4) by removing roller bearings (6) that link push-pull rods (6) to flap control plate.

**H.** Remove the luggage compartment floor to get the access to the aileron control circuit.

**I.** Disconnect aileron control (see fig. C-5) by removing pins (4) that connect the small bar (3) to the pushrods (5).

**J.** While supporting the wing, release at first the rear spar pin and then the two main spar's pins.

**K.** Replace pins in their original location and cap fuel lines.

Reverse above procedure for reinstallation paying close attention to tighten main spar bolts to the recommended value (NAS 6608-28 torque 100 Nm).

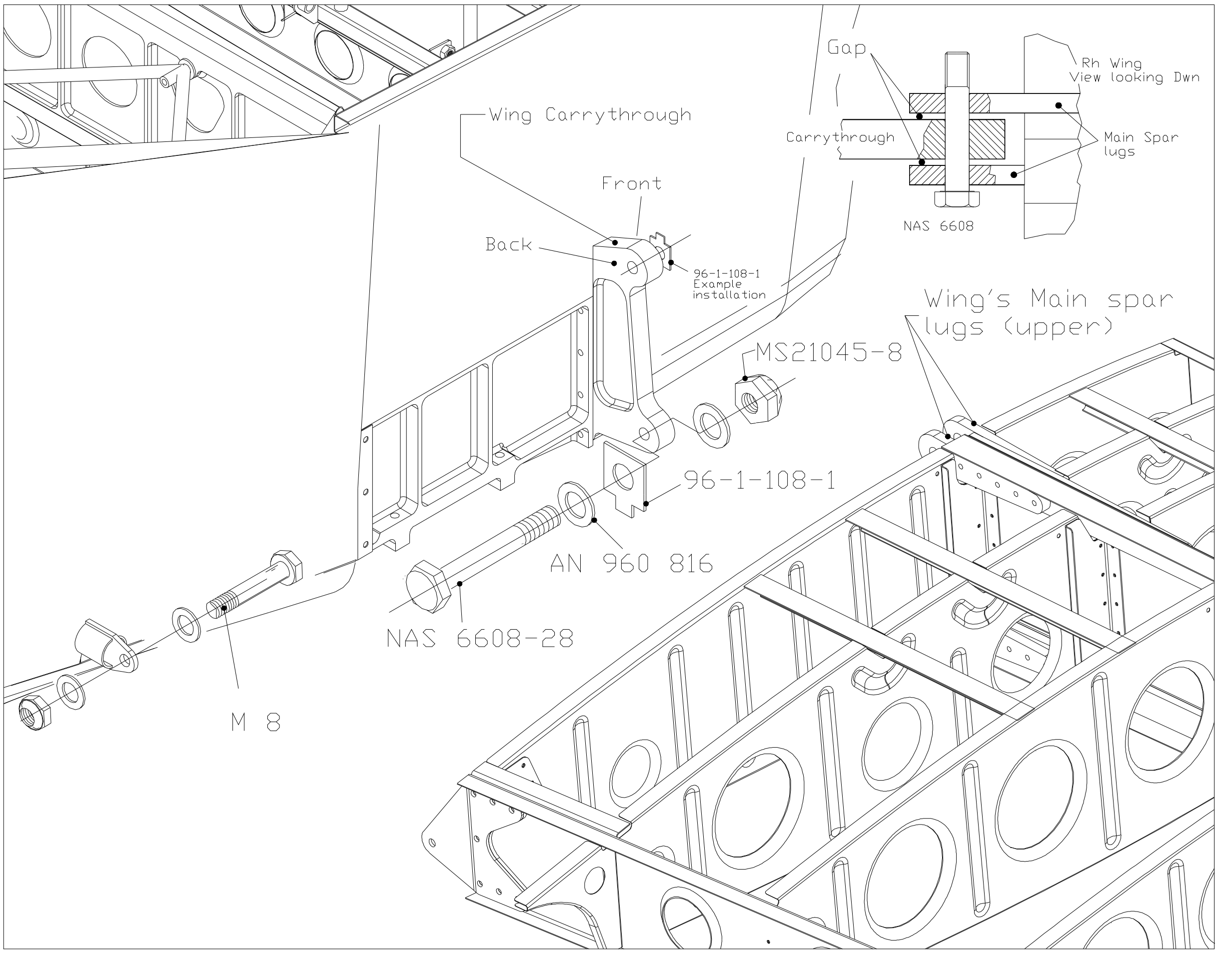


FIGURE C-3 *WING FITTING PINS*

### 2.1. FLAP CONTROL *(SEE FIG. C-4)*

Flap control system is push-pull type. The torque tube (1) is hinged to the cabin truss and connects the two moving surfaces by two levers (2). An electric linear actuator (4) governed by a switch on instrument panel controls the torque tube movements via a lever (3). Bolt, nut and cotter pin secure link.

Two push-pull rods (5) are connected to the ends of the torque tube (1) and are located in the area between wing and fuselage thus facilitating inspection.

The two push-pull rods controlling flap movement feature an adjustable linkage just before the roller bearings allowing trailing edge alignment.

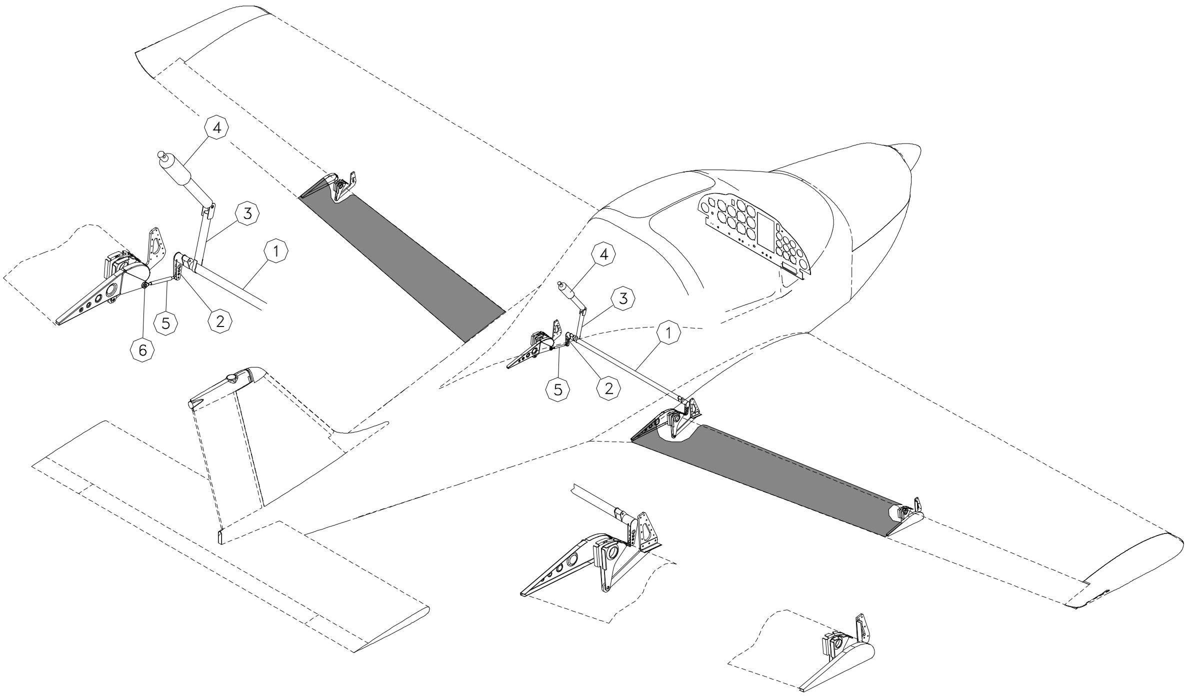


FIGURE C-4 *FLAP CONTROL*

### 2.2. AILERON CONTROL *(SEE FIG. C-5)*

Aileron control system uses push-pull rods and bellcranks inside wing and steel cables and pulleys inside fuselage.

Layout of flight control system inside cabin includes two pairs of pulleys which transmit movement from the two control sticks (1), linked in parallel by a rod (2), to a small bar (3) located under the baggage compartment floor in correspondence with main pushrods (5) issuing from the wings. Main rods (5) are connected to the small bar (3) using two pins (4). The two main rods (5), are routed through the ribs and are attached at opposite end to a bell crank (6) and a push-pull rod (7).

The push-pull rod then crosses the wing's fake spar to transmit motion. Linkage length is adjustable.

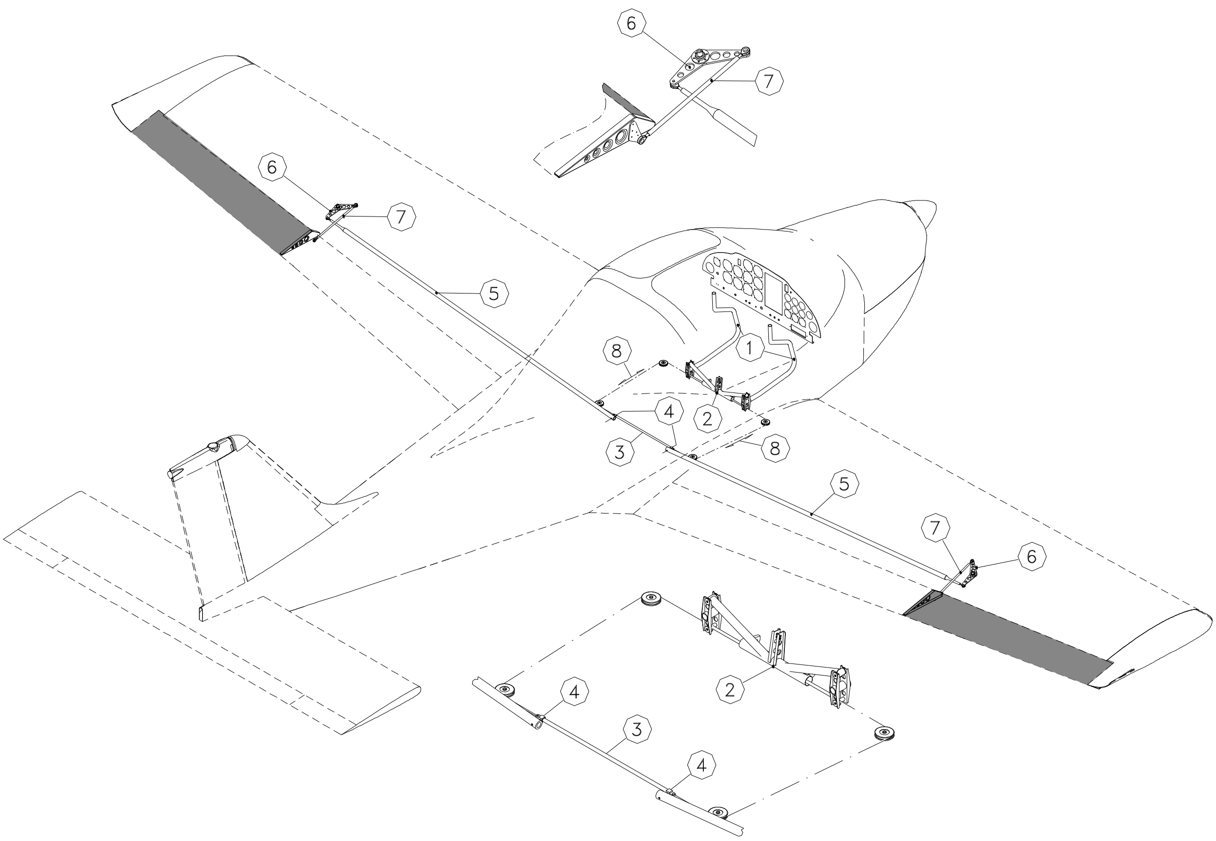


FIGURE C-5 *AILERON CONTROL*

To remove aileron, disconnect one end of push-pull rod and remove pins from hinges.

Reverse above procedure to reinstall aileron insuring that, with stick vertical, the aileron's trailing edge is aligned with wing's trailing edge.

Through access panels located on wing's bottom, check that the bellcrank lever is in neutral position, i.e. the inside arm at right angle with spar axis. To remove a wing, release pins (4) that secure short bar (3) to main rods (5). The steel cable system is designed to insure proper cable tension without the need to check whenever the wings are removed. It is however recommended that periodic checks be carried out and proper tension applied by acting on the two turnbuckles (8) located below the two seats.

Also check periodically that pulleys rotate freely and tolerance for entire linkage is within standards (ref. Section B).

If control stick should feel unusually hard, reduce cable tension as this may be the primary cause for malfunction; also check that pulleys and other parts of the link system positioned under seats are properly greased.

If control stiffness persists, check integrity of bellcranks and pulleys and insure that cable has not come off pulleys.

Alignment of moving surfaces with wing must be done using outboard trailing edge as reference. Further lateral corrections (aircraft leans to one side) may be carried out adjusting trim tab located on left aileron trailing edge.

## 3. HORIZONTAL TAIL

The horizontal tail is an all-moving type, that is, the stabilizer and elevator form a single, uniform plane called stabilator that rotates about an axis normal to fuselage at the desired pitch setting.

The stabilator structure (see fig.C-6) is made-up by an aluminium spar (1) to which a series of ribs (2) are riveted. It is covered by aluminium panels (3).

A trim tab (4) provides stick force adjustment and longitudinal compensation through an electric actuator controlled by pilot. Tab is split in two parts interconnected at the support brackets (5) and attached to the stabilator through four external hinges (6) that allow for immediate inspection.

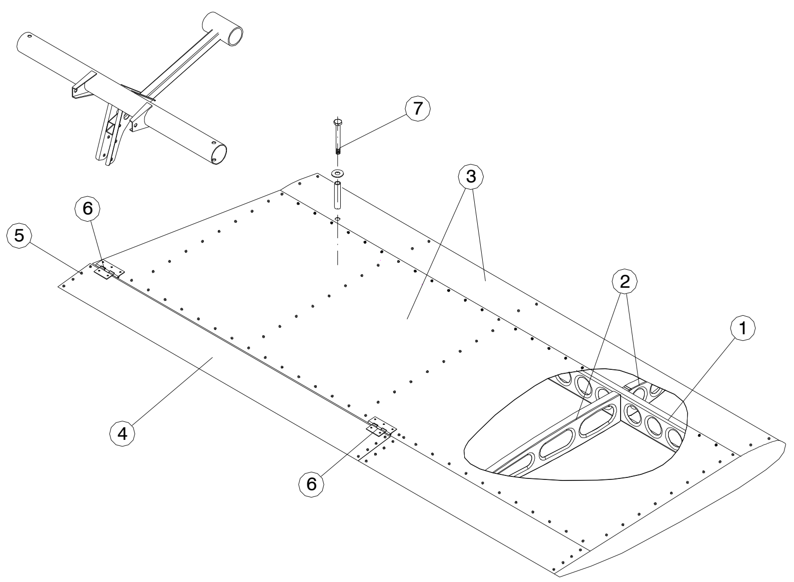


FIGURE C-6 STABILATOR

To remove the stabilator, disconnect the two halves of the tab from each other and from the control rod, remove pins and bolts (7), then remove planes. To avoid cover damage during operation, handle parts by their rigid components.

Reverse procedure for reinstallation applying a small amount of grease around the torque tube, inside the stabilator connection to facilitate insertion and gently tapping parts into position being careful not to deform outward ribs.

The stabilator control system is push-pull type (see fig. C-7) and is controlled from the cabin via the control sticks. Control is transmitted through a push-pull rod (1) linked to a bellcrank (2) and a shaft (3) that runs through the tail cone supported at midsection by a bracket (4) and connected with the stabilator's torque tube through the aft bellcrank assembly (5).

All significant transmission elements such as bellcranks, pushrods, supports and hinges can be easily accessed and inspected.

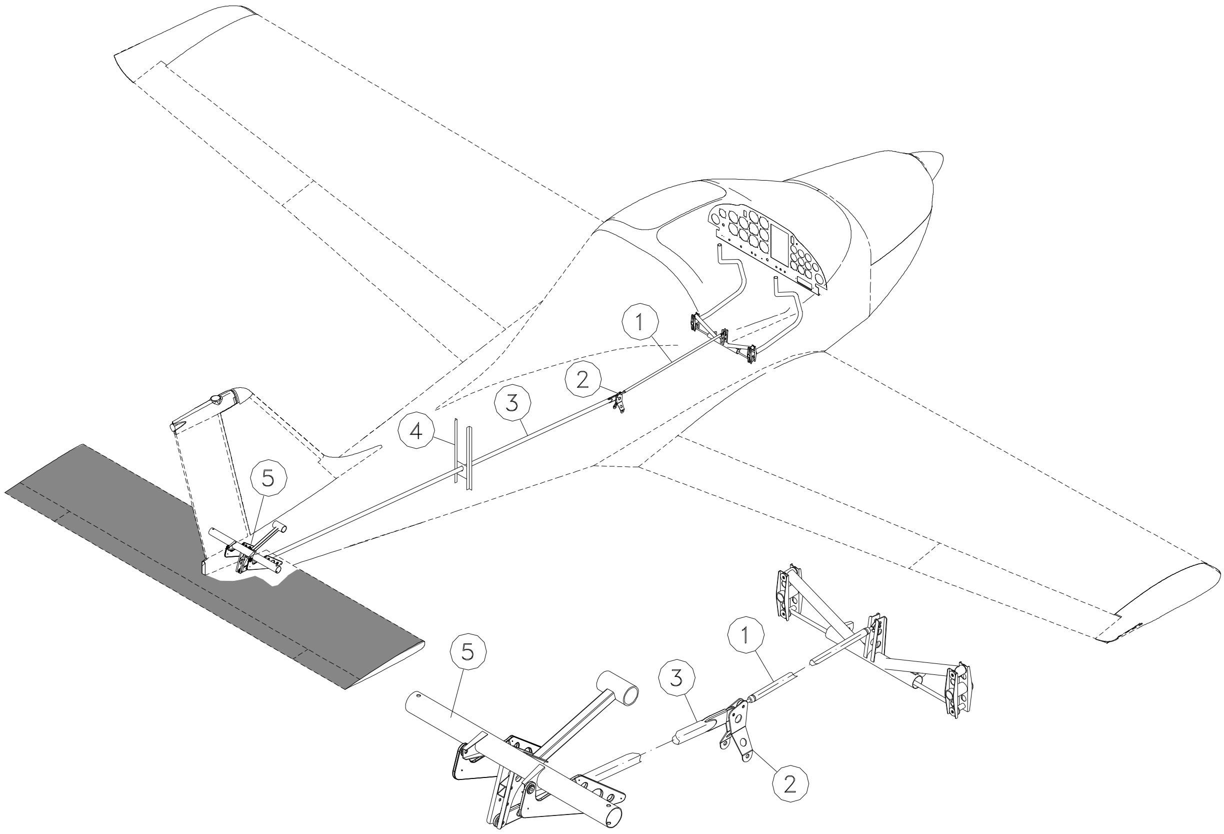


FIGURE C-7 *STABILATOR CONTROL*

If unusual tolerance is found along transmission, replace parts displaying excessive wear.

The aft bellcrank assembly (see fig. C-8) consists of a steel tube (1) with welded horn assembly (2), attachment for stabilator control shaft (3) and balanced weight bellcrank (4). Counterweight is located at the end of a prong bolted to the torque tube and entering tail cone through the tail-frame cutout.

Longitudinal trim control is available in two versions in dependence with the aircraft configuration. One of them consists in a rocker switch located on the central tunnel between the two seats. The second configuration has two switches on the top of each stick handle. For this configuration it is possible to select the left or the right controls for operation. For both configuration it is available a trim position indicator located on the instrument panel. Trim control activates the linear actuator (5) connected to supports and horn assembly (7). Actuator's motion is transmitted to an adjustable push-pull rod (8) through a bellcrank (9).

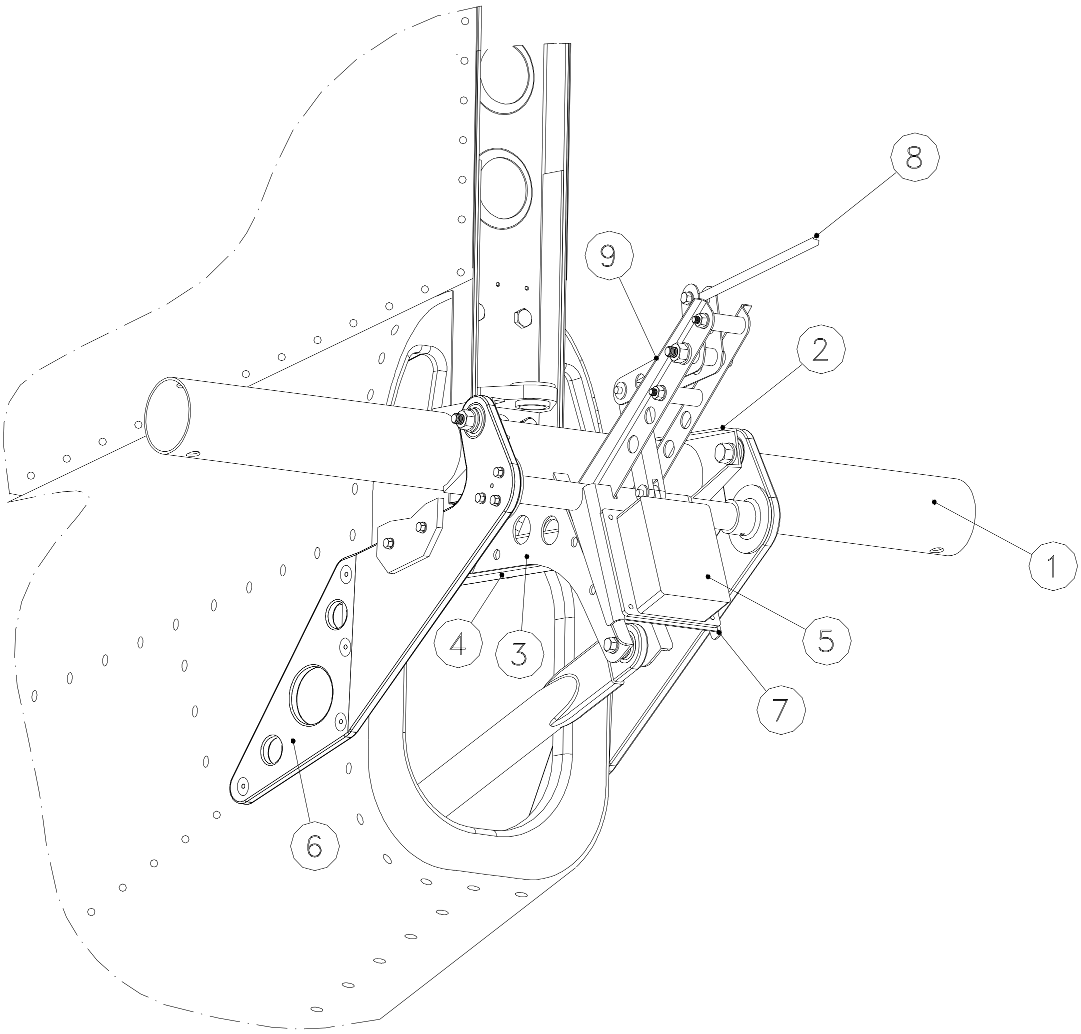


FIGURE C-8 *STABILATOR AND TRIM TAB CONTROLS*

To remove stabilator's torque tube, disconnect electric actuator frame assembly (7) from support (6), release control shaft from aft bellcrank assembly (3) then release horn assembly (2) from brackets (6).

### *3.1.* STABILATOR BALANCE

If it becomes necessary to verify stabilator balance (repairs etc.) proceed as follows:

* Remove the tail fairing;

* Disconnect the moving surface from its control rod. To avoid interference with the free rotation of the tailplane, temporarily secure control rod to the stabilator support assy;

* Disconnect the trim-tab control rod;

* Secure trim-tab to stabilator to avoid any relative movement. Use adhesive tape to avoid any influence on balance;

* Check for excessive friction or lock-ups in the moving parts;

The stabilator is balanced when the application of an 800 gr. weight at point (1) in figure above brings stabilator to horizontal position.

If the stabilator should result "trailing-edge-heavy" it is necessary to add a few small weights to the leading edge near the root.

A slight imbalance towards the leading edge is acceptable as it is deemed conservative with respect to stability.

## 4. VERTICAL TAIL

The vertical tail consists of an all-metal light alloy structure (fig. C-9). Vertical stabilizer tip is made of two pieces: one fixed to the fin and the other as a part of the rudder. The rudder composite tip can accommodate navigation and strobe lights.

The vertical stabilizer consists of a twin spar with wrap-around stressed skin paneling. An attachment plate (1) secures the vertical stabilizer's front spar to the penultimate tailcone frame while the rear spar is extended to attach directly onto the last tailcone ordinate (2).

The rudder consists of an aluminium alloy torque box made of formed sheet metal ribs (4) and sheet-metal skin (5).

The rudder rotates via two, specially designed, hinges (parts 6 and 7). At the top a ball bearing (6) let the rudder to rotate. The bottom hinge pin rotates about a bushing (8) embedded within a support flange attached to vertical stabilizer aft spar. A bellcrank (9) secured to the rudder's lower hinge converts the rudder pedals cable commands.

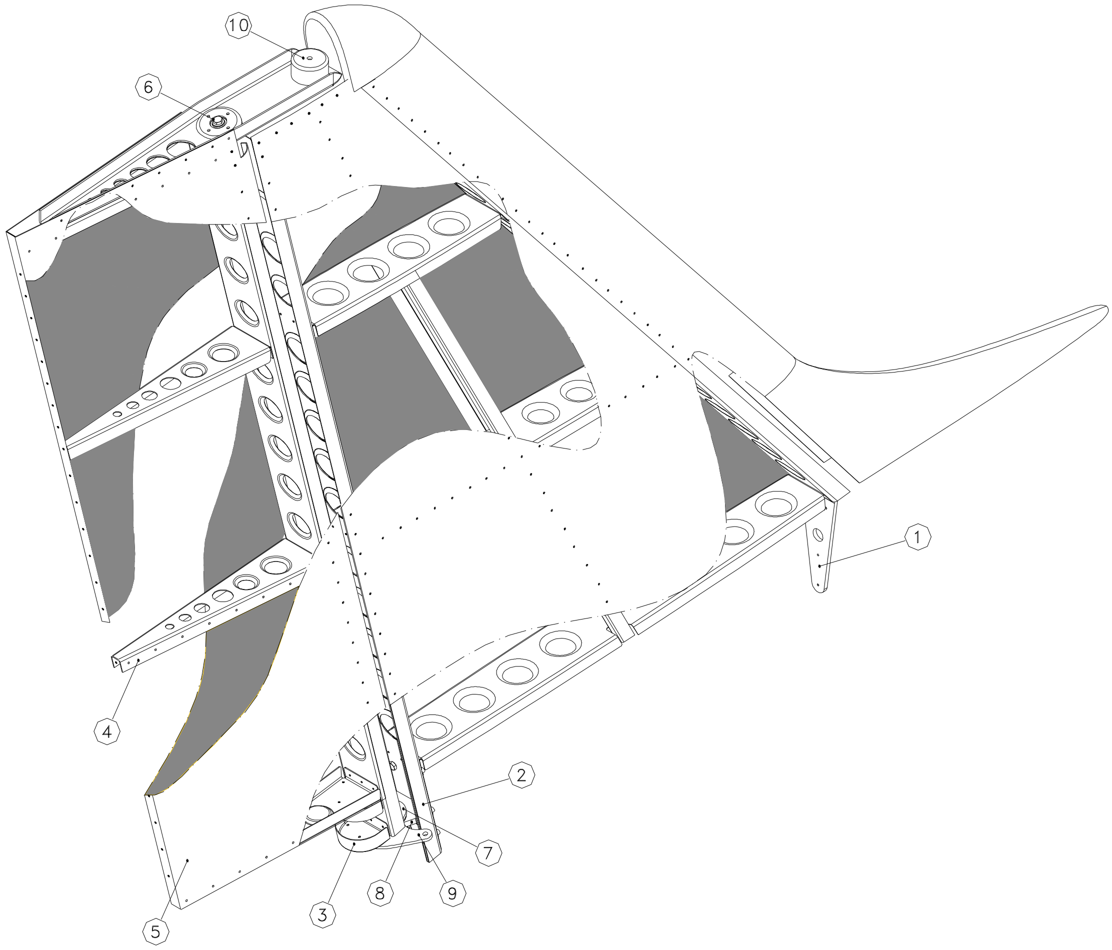


FIGURE C-9 FIN AND RUDDER

Rudder mass balancing (10) is placed on the rudder upper rib’s horn. To inspect this part it is necessary to remove the composite tip.

To remove the rudder, disconnect the control cables from the bellcrank, loose and remove the upper bolt (e.g. removing the composite rudder tip) and remove moving upwards the rudder.

Control system layout (fig. C-10) is a steel cable driven and circuit terminates on rudder pedals and then on the nose wheel steering lever.

Rudder pedals (1) are attached to two pushrods (3) that transmit steering motion to the nose gear leg through a lever. This lever hinges on the engine mount and springs connected to the steering lever via two small plates allow for a more effective realignment of the rudder. Length of pushrods can be modified via adjustable ball and socket connections.

Cable tension must be checked periodically and adjusted to proper value using the turnbuckles (Tension = 20 daN ± 2). Pulley (5) condition and their smooth operation must also be checked. To access levers and rudder pedals support, remove cabin's central tunnel; for speedier operation remove seats from railings.

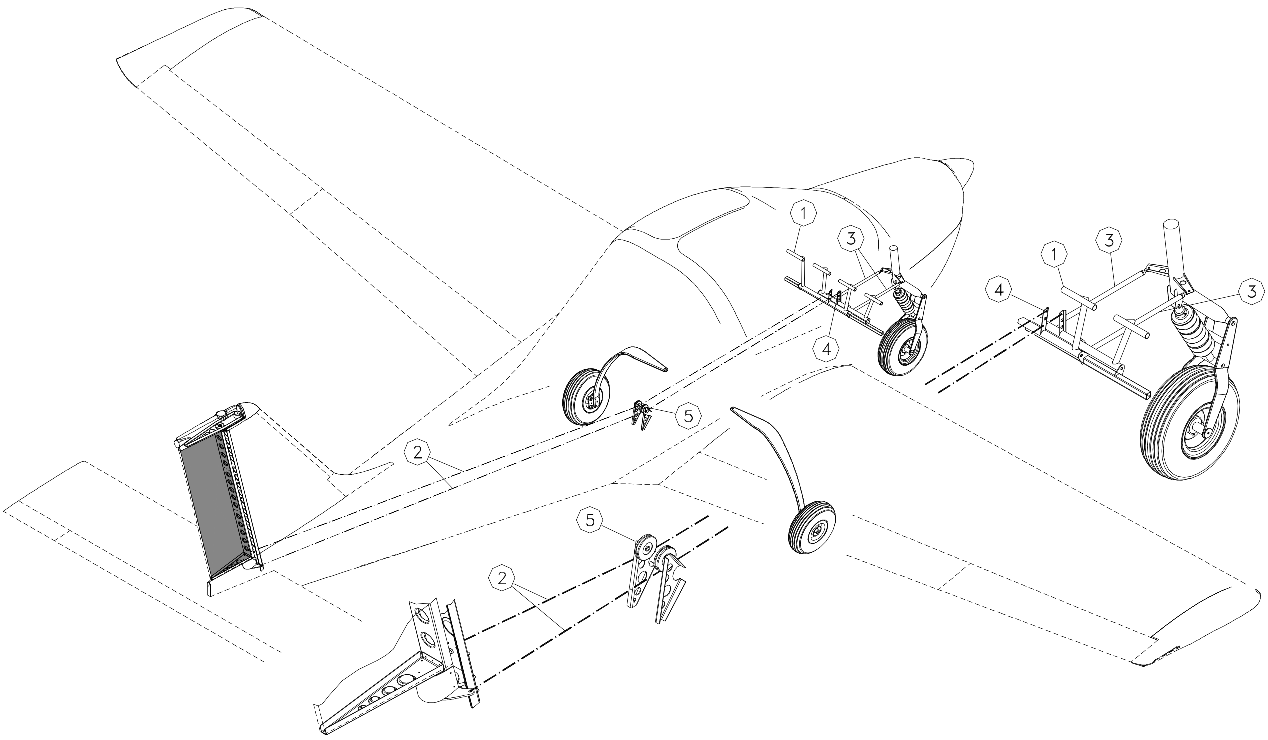


FIGURE C-10 RUDDER AND STEERING CONTROL

## 5. FUSELAGE

The front part of the fuselage is made up of a mixed structure: a truss structure with special steel members for cabin survival cell (fig. C-11), and a light-alloy semi-monocoque structure for the cabin's bottom section.

Forward truss structure drawing (fig. C-11) shows location of attachment points for wing's main spar (1), wing's rear spar (2). tail cone (4), main landing gear (5), engine mount (3), flap torque tube (7), stabilator bellcrank (6), throttle support (8) and pulley support for cable driven aileron control. Seat supports and safety harness attachment points are also shown.

The aft part of the fuselage (fig. C-12) is constructed of an aluminium alloy semi-monocoque structure. Attachments to cabin truss is at the forward fittings of four stringers (1). Two flanges are located at the aft end of the tail section to support the horizontal tail assy (2) and the vertical tail forward and aft spars (3).

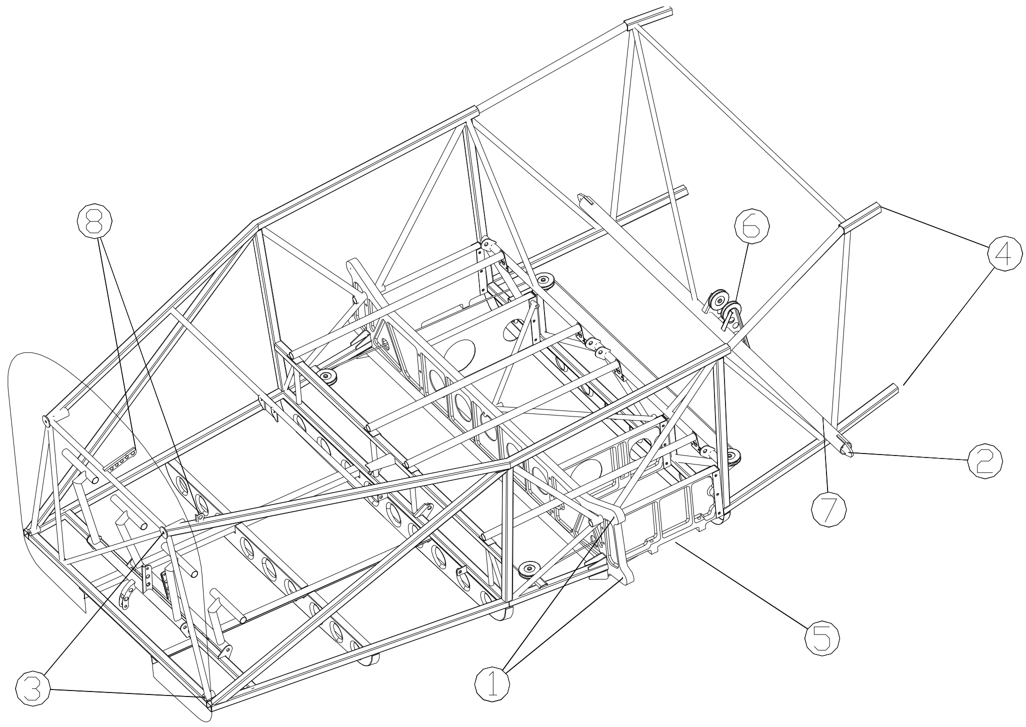


FIGURE C-11 *CABIN TRUSS*

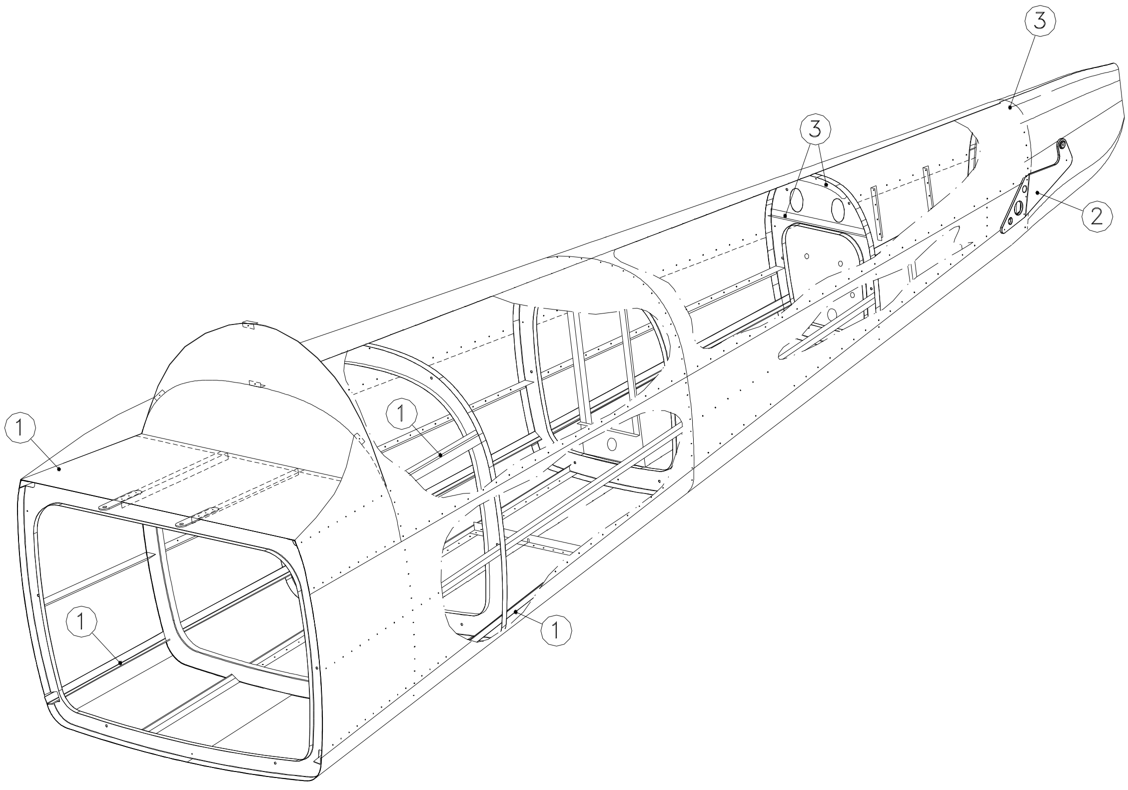


FIGURE C-12 *TAIL CONE*

Engine mount is constructed of steel tubing and is secured to the cabin truss via a four-point attachment. Bolts travel through bushings welded on mount, pass through the firewall and exit through other bushings welded to cabin truss. Nose gear support assy is attached to engine mount.

Cabin access is through a sliding canopy made of composite material. The canopy is fastened via three lock levers: one at the top and two at each side.

Seats are made out of metal tubing framework with fabric covered foam padding. The two seats can be independently adjusted by sliding backward and forward along rails fixed to cabin truss structure. Seat release levers are located just below seat cushions.

Cabin floor is constructed of light alloy and features matting.

Entire fuselage, wing and other exposed surfaces are finished with a highly resistant weatherproofing synthetic coating.

Wash using only water, mild detergent and chamois. All parts in *Perspex* material must never be dusted dry, but washed with lukewarm soapy water. In any case, never use, on this kind of surface, products such as gasoline, alcohol or any kind of solvent.

## 6. LANDING GEAR

The main landing gear (see fig. C-13) consists of two special steel spring-leaf struts (1) positioned crossways to fuselage for elastic cushioning of landing loads.

Each spring-leaf (1) is connected to the fuselage via two keelsons (2,3). Two spacers (4,5) are inserted between each spring-leaf and the keelsons. Two bolts (7) and nuts secure the individual spring-leaf to the edge of the outer keelson (2) via a light alloy tie (6) while a single bolt (8) and nut secures the inboard end of the leaf-spring to inner keelson (3).

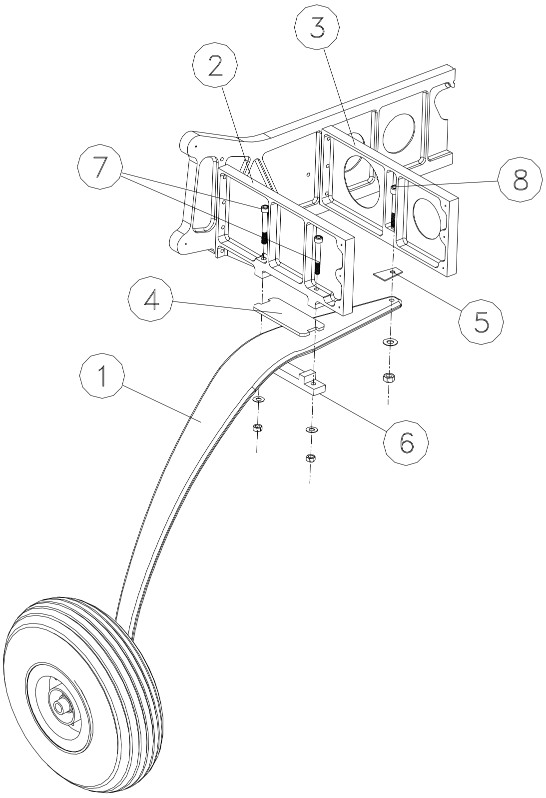


FIGURE C-13 *MAIN LANDING GEAR*

Wheels are cantilevered on gear struts and feature hydraulically actuated disc brakes (see fig.s C-14 & C-15) controlled by a lever (1) located on cabin tunnel between seats. Main gear wheels mount Air Trac type 5.00-5 tires inflated at 23psi (1.6 bar). Hydraulic circuit shut-off valve (2) is positioned between seats. With circuit shut off, pulling emergency brake lever activates parking brake function.

Braking is simultaneous on both wheels (via a "T" shaped joint (6)).

Control lever (1) activates master cylinder (3) that features built-in brake-fluid reservoir (4). The brake system is equipped with a non-return valve (5), which insures that braking action is always effective even if parking brake circuit should accidentally be closed.

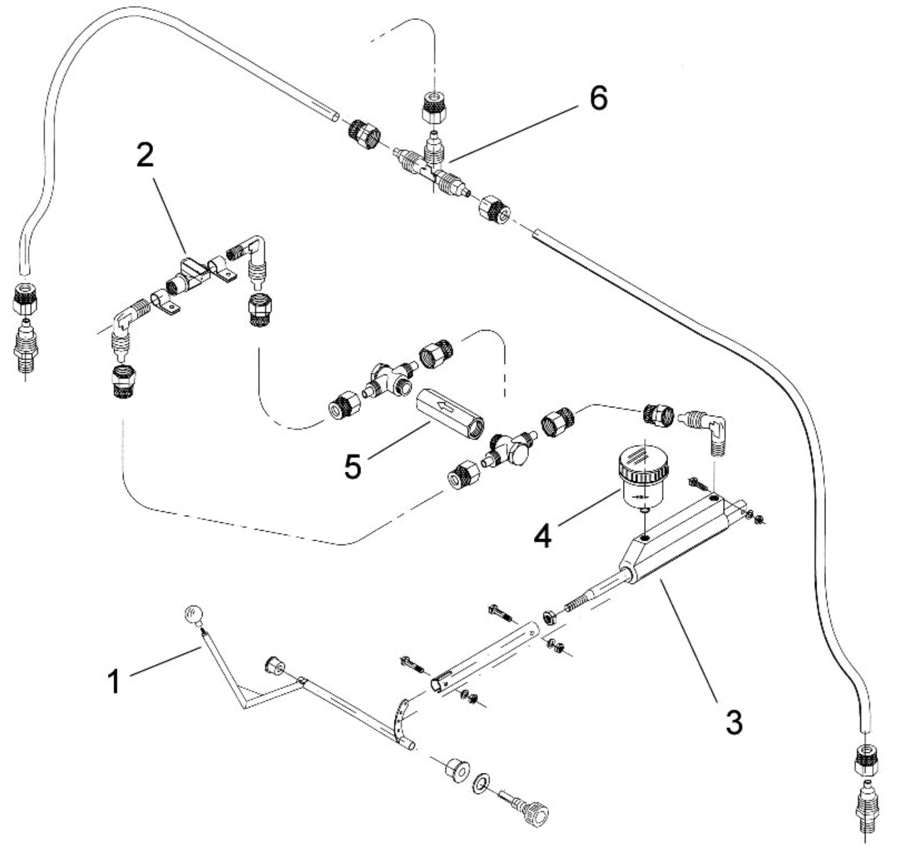


FIGURE C-14 *BRAKES CIRCUIT*

To remove each leaf-spring strut proceed as follows:

**A.** Remove the luggage compartment floor;

**B.** Hoist aircraft onto supports;

**C.** Disconnect each spring-leaf brake fluid line unscrewing the upper links from the Tee connection (6). Placing temporarily caps on lines to prevent spillage;

**D.** Loosen the two external bolts and unfasten the aluminum tie (part.6 fig. C-13) that secure spring-leaf to the outer keelson.

**E.** Remove bolt (part.8 fig. C-12) connection between inboard end of spring-leaf and the inboard keelson;

**F.** Remove gear strut by pulling it outward from the fuselage.

Reinstall using a reverse procedure. It is however necessary to eliminate any trapped air from the brake circuits: once the brake circuit is closed and fluid in reservoir is at normal level, bleed air through dedicated valve. For best results, use external pump to push fluid through valves allowing trapped air to escape through open reservoir.

If braking action appears degraded, check and eventually replace main gear brake pads.

Refer to Periodic Inspection Chart in Section B for any service operation to main gear.

## *6.1.* REMOVAL OF THE MAIN LANDING GEAR WHEEL *(SEE FIG. C15)*

Removal of a single wheel is carried out as follows:

**A.** Hoist aircraft onto supports (see Sect. B).

**B.** Release parking brake.

**C.** Remove fairing (1) by releasing bolt (2) and the three Phillips screws (3) that hold fairing to plate.

**D.** Remove bolt (4) and cup (5)

**E.** Remove wheel lock nut (6)

**F.** Unscrew brake assy bolts (7).

**G.** Pull tire off with both hands.

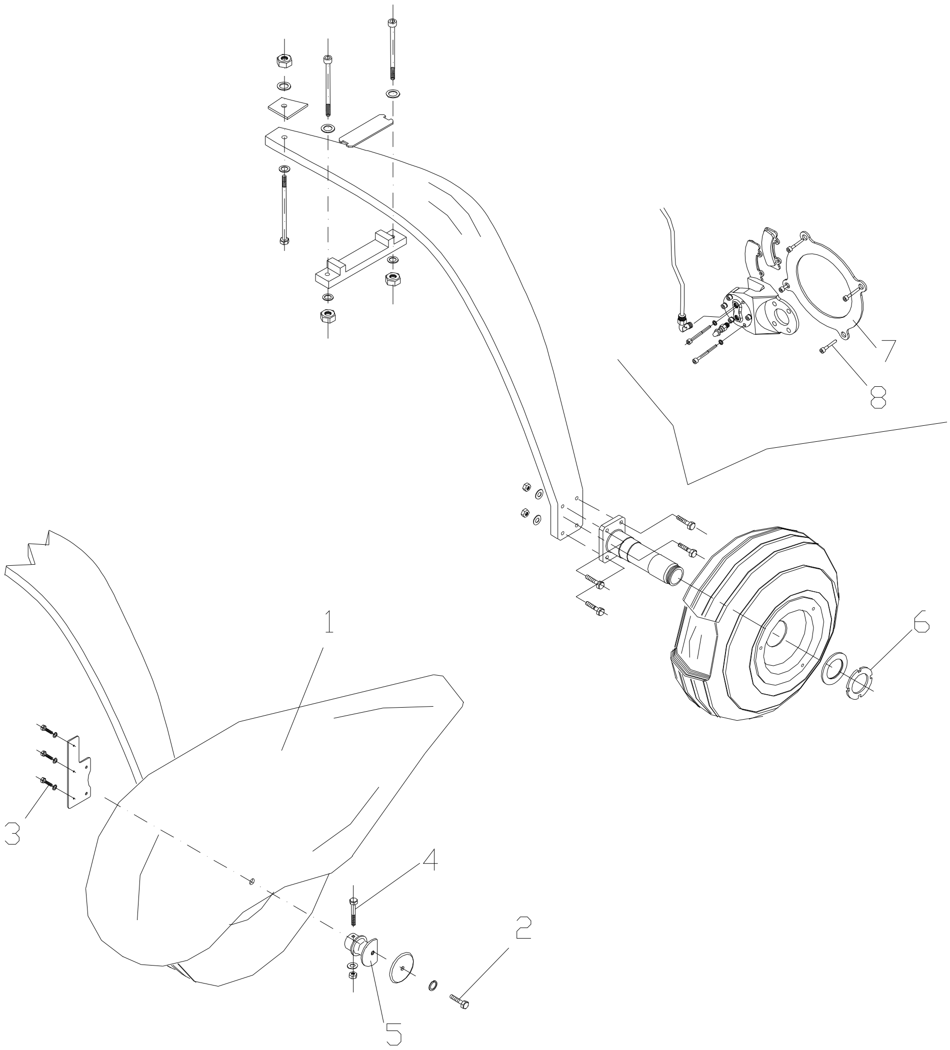


FIGURE C-15 REMOVAL OF THE MLG WHEEL.

## *6.2.* REMOVAL OF THE MLG WHEEL ROLLER BERINGS *(SEE FIG.C16)*

Removal of a wheel bearing becomes necessary when excessive friction occurs during wheel motion. Procedure is as follows:

**A.** Pull out the wheel (1) from the axle (3) by unscrewing the nut (2).

**B.** Remove bushing (4) and the plates (5)

**C.** Remove the roller bearing (6).

Clean the bearings accurately using appropriate solvent and wipe wheel rim side. Grease using FIAT ZETA2.

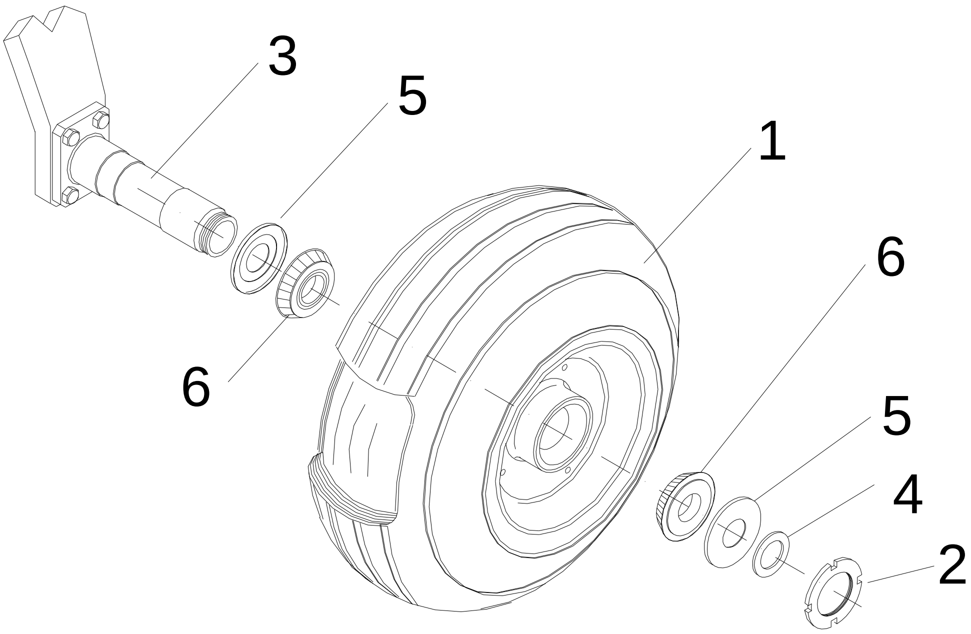


FIGURE C-16 REMOVAL OF THE MLG WHEEL ROLLER BEARINGS

## *6.3.* NOSE LANDING GEAR

The nose gear (fig. C-17) is attached to the engine mount with two hinges (1) and is equipped with a Sava 4.00-6 type tire.

Steering motion is transmitted from the pedals through two steering tubes that are attached to the nose gear strut by means of two brackets (2) welded to the strut.

Gear fork is made up of light alloy plates (4) & (5) and a spacer (6); it hinges on the strut leg and is braced by a rubber-disc shock absorber (3).

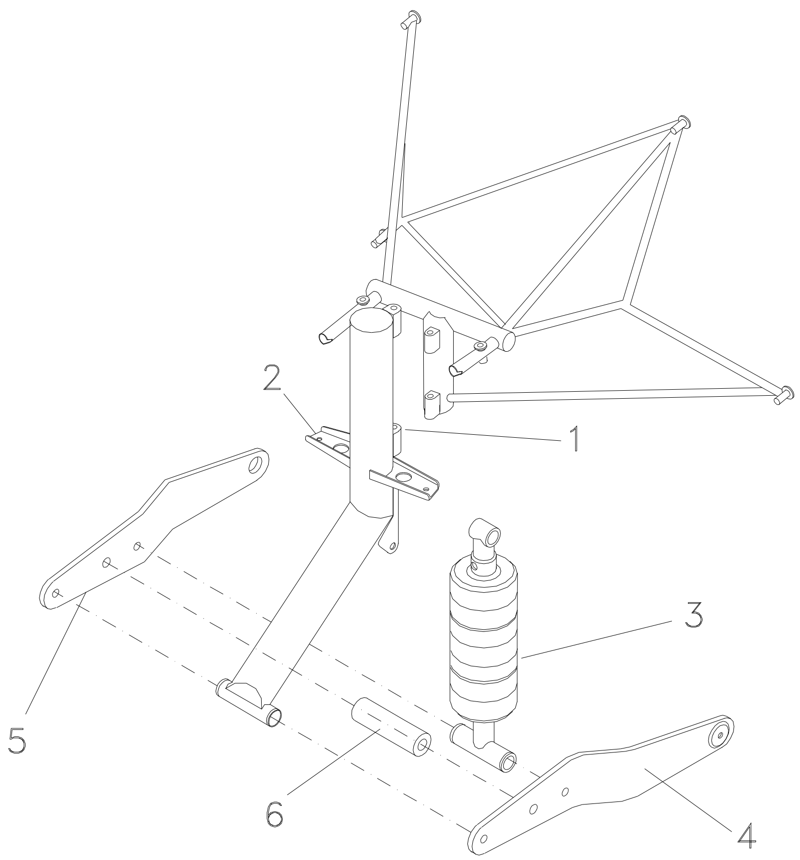


FIGURE C-17 NOSE LANDING GEAR LEG

### 6.4. NLG WHEEL REMOVAL *(SEE FIG.C-18)*

To remove the nose gear fairings proceed as follows:

**A.** To remove front portions of the fairing (5 & 6) loosening the screws (2) and (3)

**B.** Remove the two fairings (6) and (5).

**C.** To remove the rear upper fairing (4) loosen the screws (1)

**D.** Unscrew nuts (7) and remove washer from wheel axle

**E.** Unscrew bolt (8) in gear lever housing.

**F.** Remove the rear fairing (9)

Reverse procedure to reinstall. Avoid to damage the fiberglass fairing by not tightening screws excessively.

To remove nose wheel proceed as follows:

**A.** Remove the fairings (5) (6) and (9)

**B.** Loosen bolts (10), (11) and (13)

**C.** Detach the two wheel forks (12) from each other.

**D.** Remove wheel axle

**E.** Remove the wheel (13)

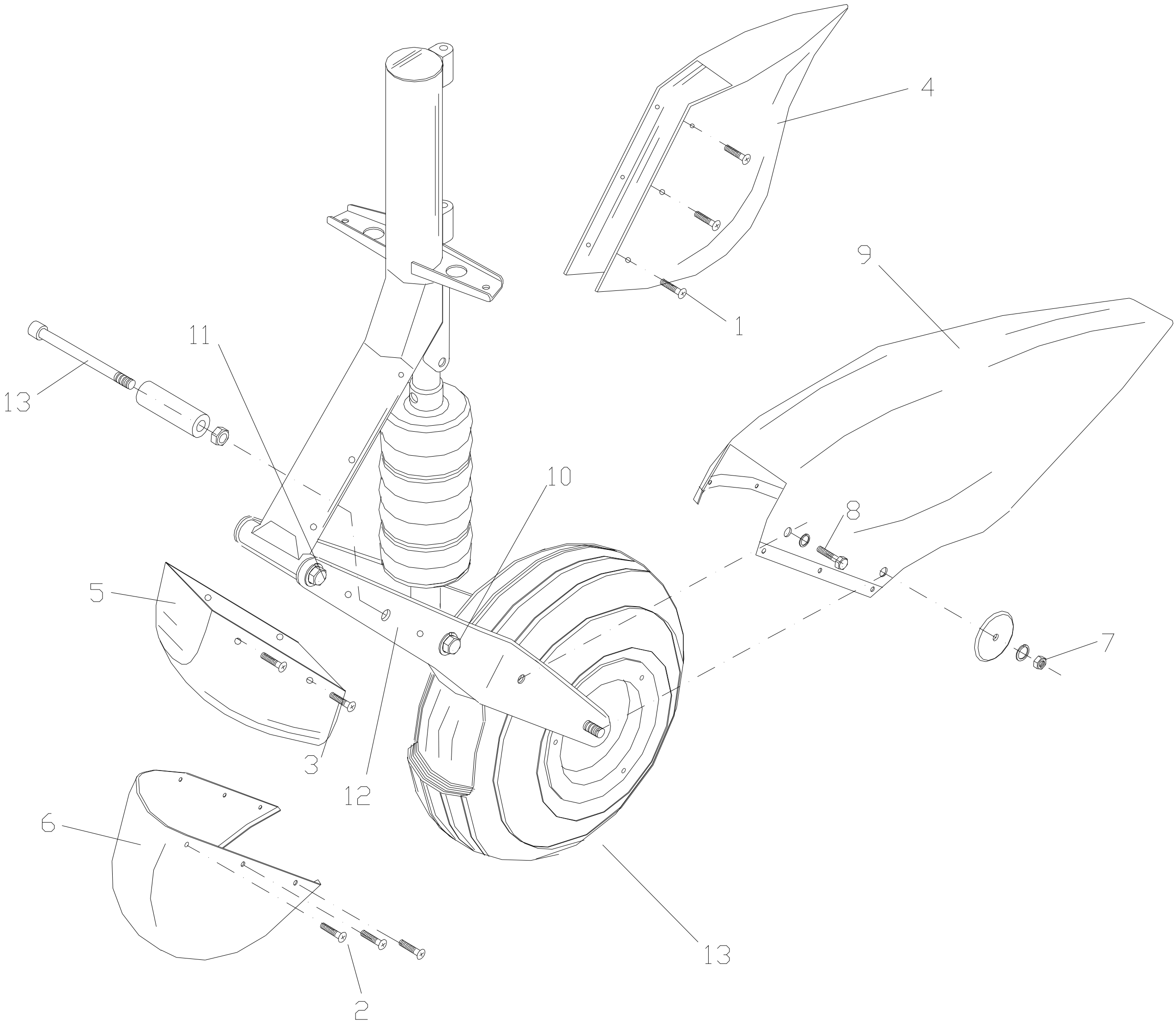


FIGURE C-18 NLG WHEEL REMOVAL

**SUMMARY OF TIRE INFLATION PRESSURE**

| | |
|---|---|
| Nose tire | **15 psi** *(~ 1.0 bar)* |
| Main tires | **23 psi** *(~ 1.6 bar)* |

# SECTION D

# POWERPLANT

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# 1 - POWERPLANT

## 1.1 COWLING

The engine cowling is gull wing type. The cowling is made up of two parts: the upper part consists of a fiberglass nose and a light alloy panel while the bottom part is entirely made of fiberglass.
Cowling top is easily removed by releasing four latches, two on each side.
Removal of lower portion is just as easy by quick release of two side pins and two latches located on bottom (see fig. D-1).
If any cracks are detected, immediately drill stop holes at crack ends.
Air circulation is provided by front openings in nose section and by an outflow area on the underside by the firewall.

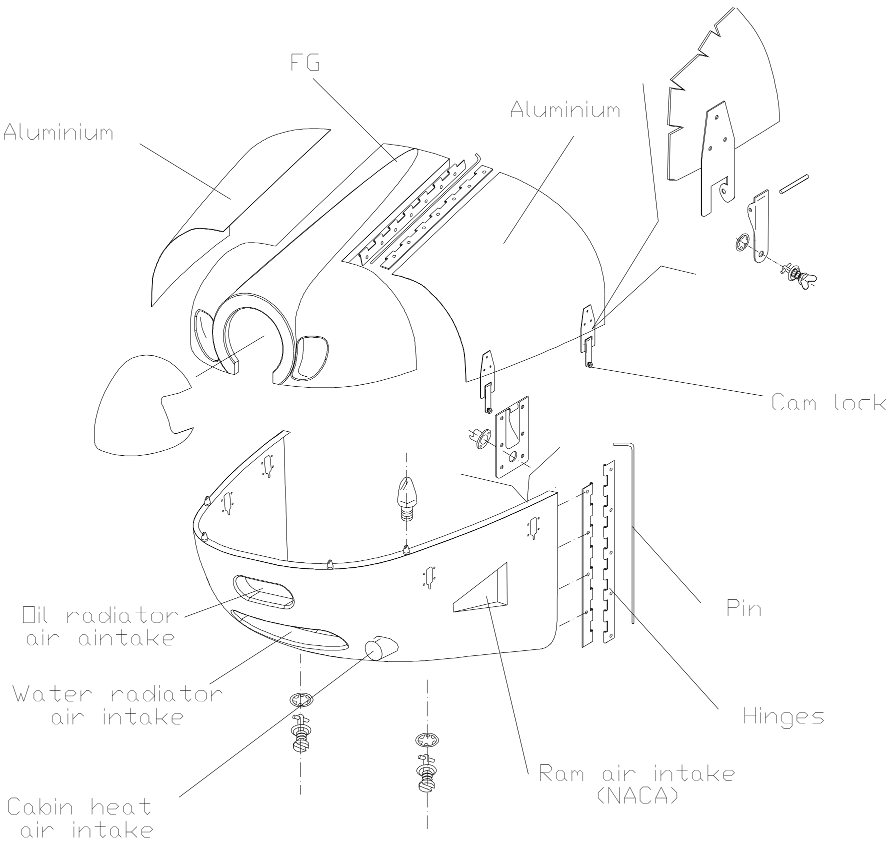


FIGURE D-1 *ENGINE'S COWLING*

## 1.2 ENGINE MAIN FEATURES

The installed engine is a BOMBARDIER-ROTAX type 912 ULS horizontally-opposed four-cylinder, one central camshaft with pushrods and OHV. Other features include liquid cooled cylinder heads and ram air-cooled cylinders. Prop drive is via reduction gear with integrated shock absorber and overload protection.

Electric starter, integrated AC generator and mechanical fuel pump are standard.

Technical data:

| | |
|---|---|
| - Maximum power rating | 73.5 kW |
| - rpm @ max power | 5800 rpm |
| - Cruise power rating | 69.0 kW @ 5500 rpm |
| - Bore | 84 mm |
| - Stroke | 61 mm |
| - Displacement | 1352 $cm^3$ |
| - Compression ratio | 10.5: 1 |
| - Firing order | 1-4-2-3 |
| - Direction of rotation of prop shaft | cw (pilot's view) |
| - Max temp. Cylinder heads | 135° C |
| - Fuel | See Doc. 2002/57 Flight Manual – Sect 2 |
| - Reduction ratio | 1 : 2.4286 |

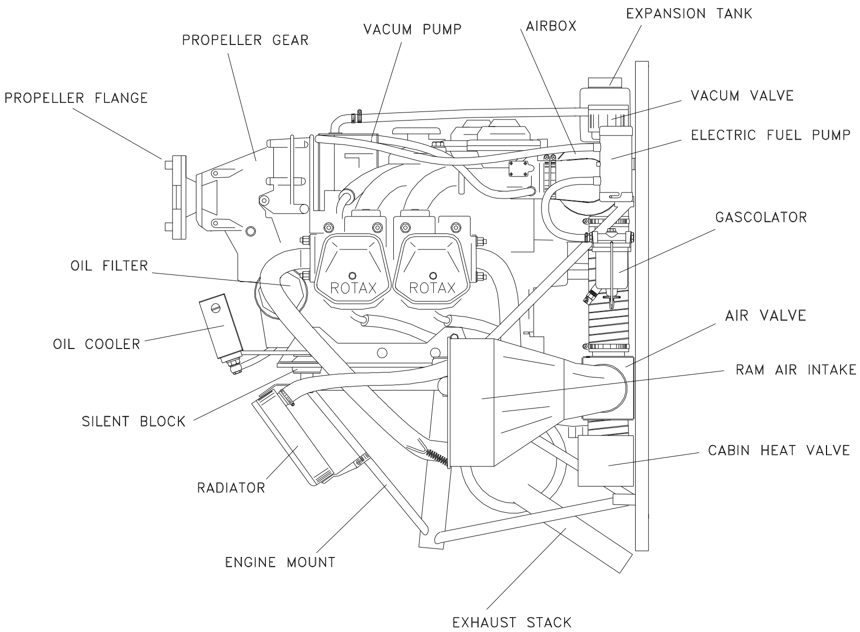


FIGURE D-2 *ENGINE'S INSTALLATION*

## 2 - GENERAL SERVICING PROCEDURES

### 2.1 IDLE SPEED SYNCHRONIZATION

With the exception of idle speed synchronization, no other carb. regulations are required. Fuel mixture is controlled and set by manufacturer and requires no further adjustment.

### 2.2 ORDINARY SERVICING

For all servicing operations refer to the Maintenance Manual (Line Maintenance) (p/n 899372 Issue 0 of 1/9/1998 and later versions) furnished along with the present manual.

## 3 - PROPELLER

The propeller is manufactured by “F.lli Tonini” and is all-wood, with composite reinforced leading edge and blade protective finished with special lacquer coating.

### 3.1 PROPELLER REMOVAL

To remove propeller use the following procedure:

A) Remove screws holding spinner dome to spinner bulkhead;
B) Remove safetying;
C) Remove bolts that secure prop to hub.

After removal, do not lay propeller down on its tip but always lay flat and away from sources of humidity, heat or, in any case, away from areas subject to excessive temperature change.

### 3.2 PROPELLER INSTALLATION

To install propeller, follow procedure below insuring propeller is correctly aligned with hub before tightening bolts:

A) Carefully clean hub area insuring no oil traces are present;
B) Check bolts for cracks, rust, proper thread and cleanliness;
C) Check spinner bulkhead for cracks or deformations;
D) Check spinner for cracks and deformations;
E) Install spinner spacer and prop;
F) Insert washers and fasten locknuts (bolt torque = 18 Nm);
G) Safety all bolts;
H) Install spinner.

After correct installation of propeller and before takeoff, let the engine run for a few minutes and, after turning it off, carry out further inspection (tightness, overall state, etc.).

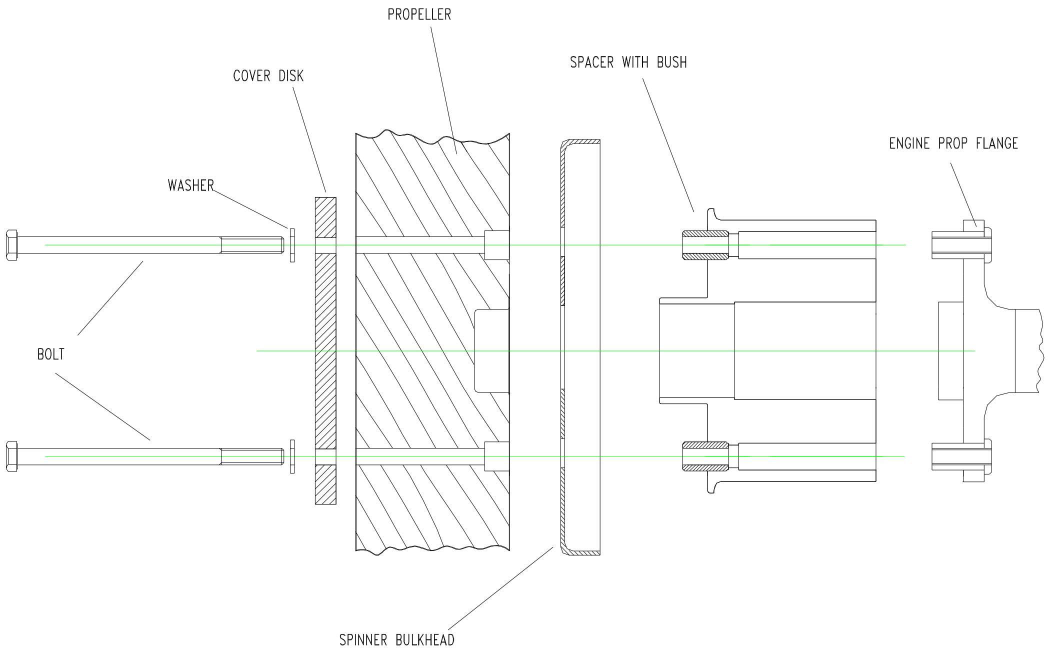


FIGURE D-3 *PROPELLER INSTALLATION*

## 3.3 PERIODIC INSPECTION

Refer to specific subsection in Periodic Inspection Schedule of Section B.

For further information refer to *"Owner'Manual"* furnished by the manufacturer

# SECTION E

# SYSTEMS

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## 1 – FUEL SYSTEM

The system is equipped with two aluminium fuel tanks (1) integrated within the wing leading edge and accessible for inspection through dedicated doors (2). Capacity of individual tank is 50lt for a total of 100lt.

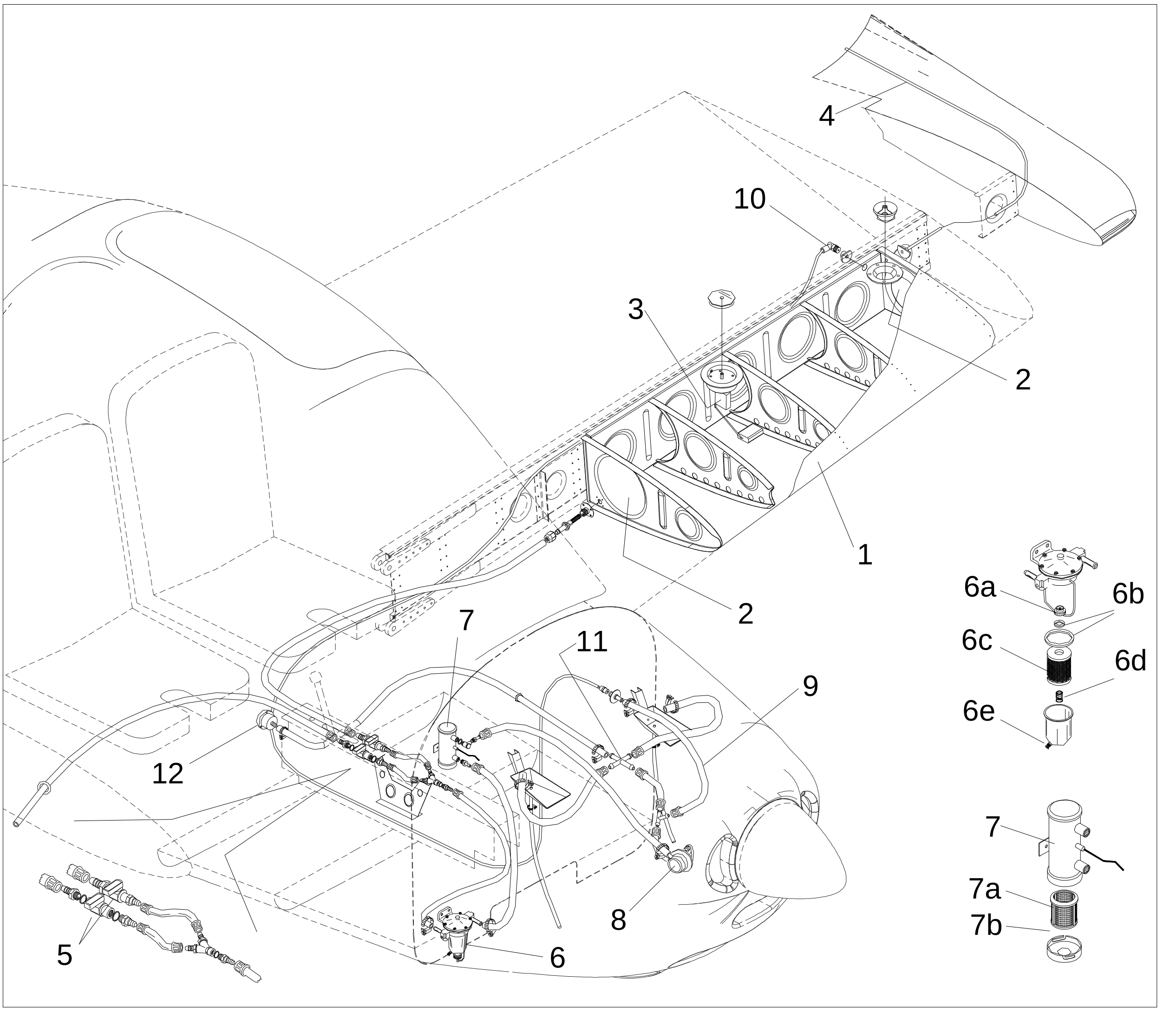


FIGURE E-1 *FUEL SYSTEM*

Each fuel tank is equipped with a cabin installed shutoff valve (5). A strainer cup with a drainage valve (6) (Gascolator) is located on the engine side of the firewall. Fuel level indicators for each tank are located on instrument panel, each fuel tank is equipped with individual sensor-floats (3). Fuel feed is through an engine-driven mechanical pump (8) and through an electric pump (7). Electric pump is equipped with a thin-mesh filter (7a) that can be accessed for inspection via the bayonet-style filler cap (7b). A fuel pressure indicator gauge is located on the instrument panel and fed directly from the fuel manifold “X” connection (11) by a firewall pass through hose.

Figure E-1 illustrates the components of the fuel system.

Inside piping from topmost point of each fuel tank connects to fuel vents (4) located on wing tip trailing edge.

Fuel outlet is located at the lowest point of the inboard sidewall of each fuel tank and is equipped with a standard mesh filter (2) (see Fig. E-2). To carry out periodic cleaning of mesh filter (2), it is necessary to remove the hose (4) after releasing nut (3).

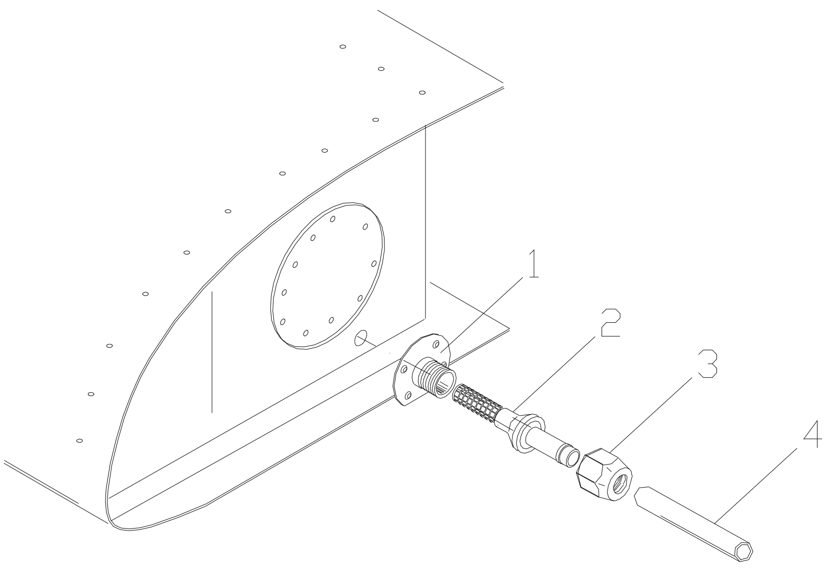


FIGURE E-2 *TANK OUTLET AND FILTER*

Potential fuel tank leaks can be readily detected by the visible fuel traces. Repairs can eventually be made, only if cracks are small and using specific glue type (1422-B2 DMS 2082), after emptying tank and thoroughly and repeatedly rinsing the area with water.

Periodically check fuel tank vents to ensure that their openings are unobstructed; repeat inspection more frequently if operating in dusty conditions. It is recommended, for inspection, to use a small rubber hose to blow through the vent to clear possible obstructions.

Fuel system servicing includes also the periodic inspection of the Gascolator drain-cup (6e) and filter (6c) in addition to the inspection of the entire fuel line.

The figure E-3 shows a schematic of the fuel system.

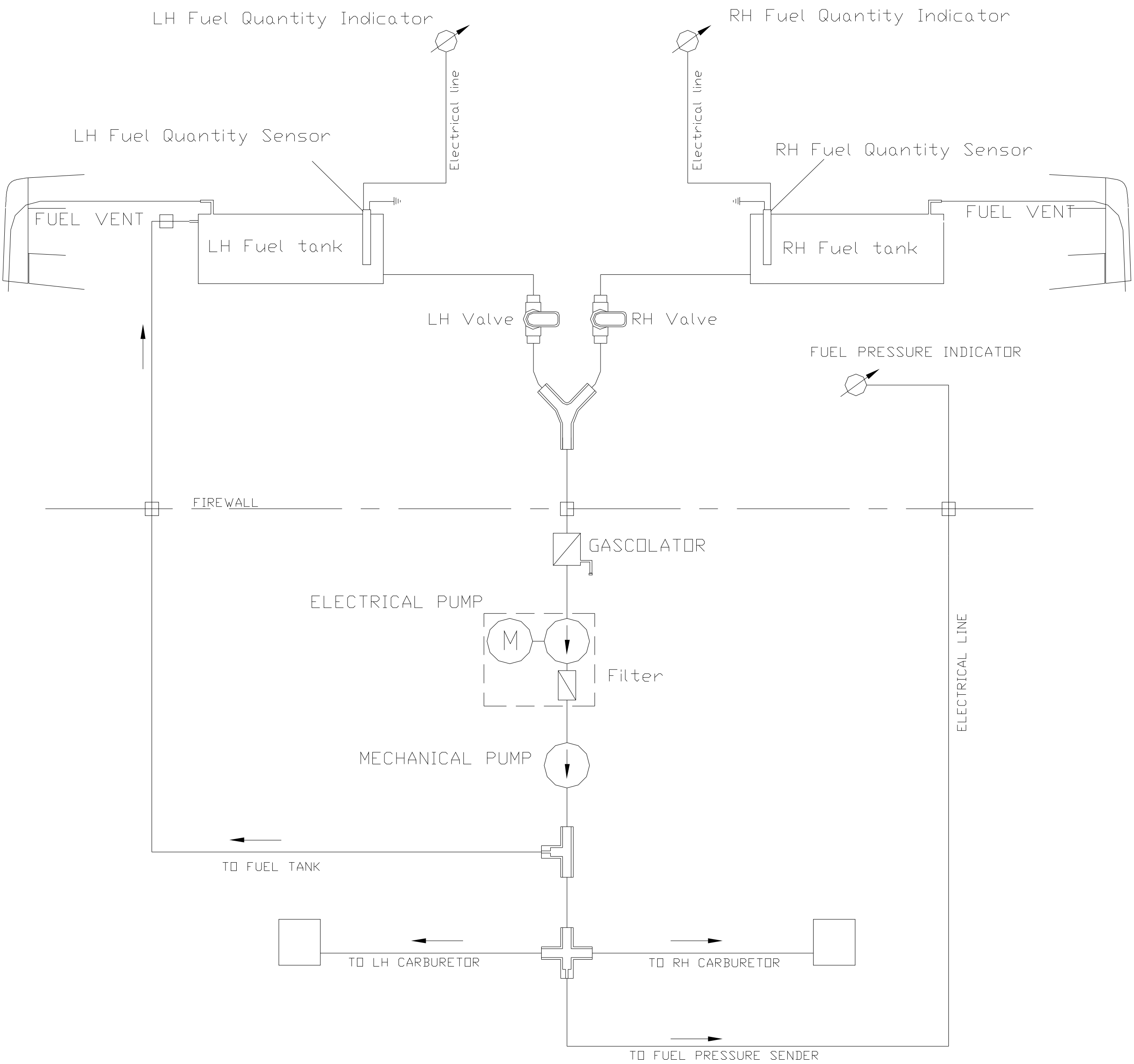


FIGURE E-3 *FUEL SYSTEM LAYOUT*

## 2 - INSTRUMENTS

The aluminium instrument panel (see Fig. E-4) is sub-divided in three distinct areas: The left area holds flight instruments, the right area holds engine controls and the central area can holds nav/com instruments (if installed). The lower portion of the instrument panel holds:

- switches for magneto and navigation, landing and strobe light if installed;
- flap switch and circuit protection fuses;
- throttle knobs.

Individual instruments may be accessed for removal by releasing screw located next to magnetic compass and sliding instrument panel protective cover along railings. Before removing individual instruments, use particular care in disconnecting wires, hoses or other links as the case applies.
When installing instruments, follow recommendations below:

1) Do not over-tighten bolts as plastic instrument casing may break.

2) Insure hoses are free of any foreign matter and that no tight radius turns are present as this may choke hose or cause malfunction.

3) Insure proper grounding and tightening of all electrical instruments.

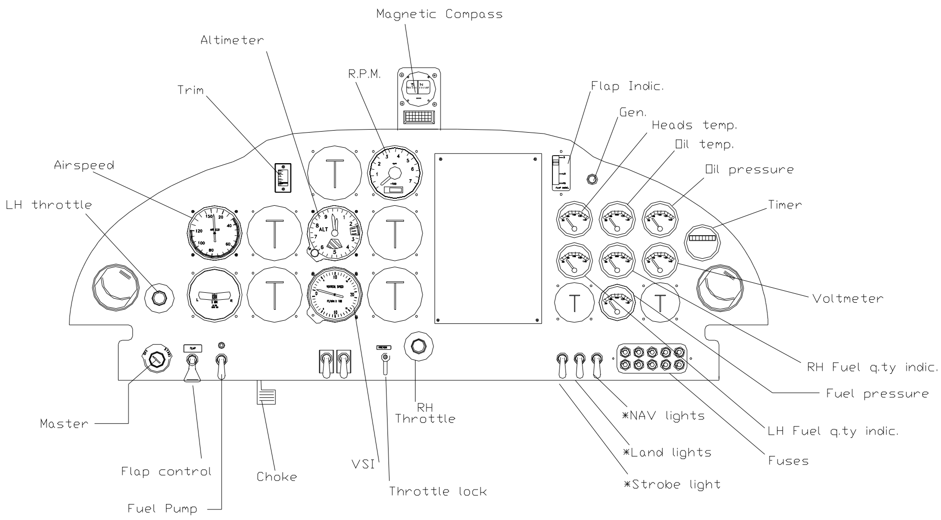


FIGURE E-4 *INSTRUMENT PANEL*

2.1 - ENGINE INSTRUMENTATION

- An electric tachometer is installed;
- An electric oil temperature indicator is installed. The sensor is located on the oil pump tube and is marked with "TO" on the pump flange.

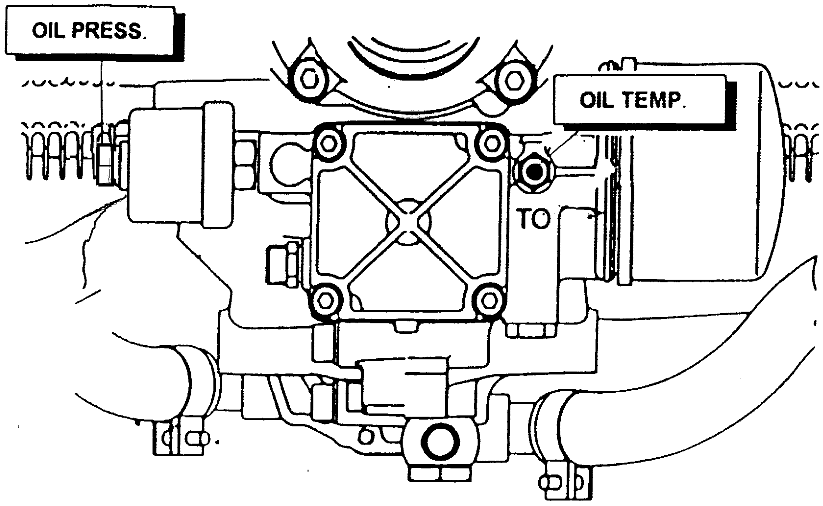


FIGURE E-5 *PRESSURE AND OIL TEMP. SENSORS*

- An oil pressure instrument is installed. Sensor is located on oil tube.
- Cylinder head temperature sensors are located on cylinders 2 or 3 and are linked with relative instrumentation.

## 3 - PITOT AND STATIC SYSTEM

Referring to figure E-6, system consists of an airspeed sensor assembly (1) mounted below the left wing. The airspeed sensor assembly is made of a Pitot tube (3) and four static ports (6) drilled on a tube (2) parallel to the Pitot. Flexible plumbing connects pitot and static ports to pressure instruments. The airspeed system drainage could be carried out by disconnecting the fittings (5) between the wing and fuselage part of the system.

Servicing the system is easy and is carried out in accordance with schedule listed in the Periodic Inspection Table found in Section B; simply remove tubes from instruments and blow air in tube in port direction and never vice versa, clearing possible obstructions and checking line condition.

Check visually and more frequently Pitot tube (3) and static ports (6) clearing possible obstructions.

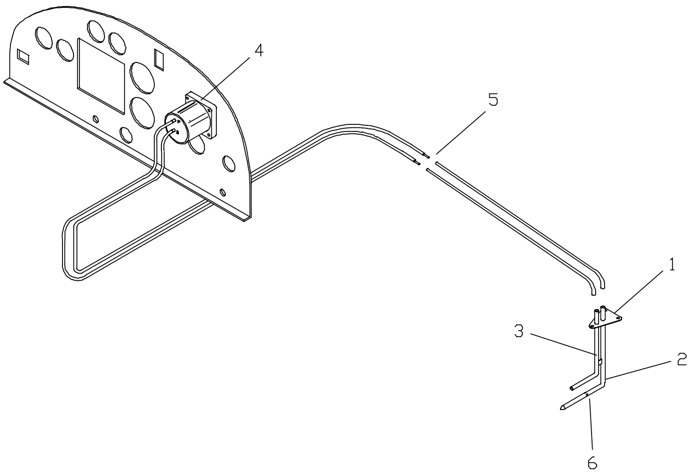


FIGURE E-6 *PITOT AND STATIC SYSTEM*

For safety reasons and to ensure correct airspeed readings, it is important to check the airspeed system for leaks adopting the following procedure:

Fasten a piece of rubber hose approximately 30 centimetres long to the Pitot tube, close off the opposite end of the hose and slowly roll it up until the airspeed indicator shows cruise speed. Constant reading is an indication of no leak in system.

**WARNING**

*Avoid blowing air through Pitot or static ports, as this causes immediate damage to the airspeed indicator*

## 4 - EXHAUST MANIFOLDS

With reference to figure E-7, exhaust manifolds (1) are flanged to the engine and join the muffler separately (2). The muffler also works as a heat exchanger (3) for carb. and cabin heat.
The exhaust system must always be checked for possible cracks (ref. Periodic Inspection Table Section B). Close attention must be given to the heat exchanger system which should be totally disassembled for inspection as cracks would allow noxious fumes to be mixed with carb and cabin air heat.

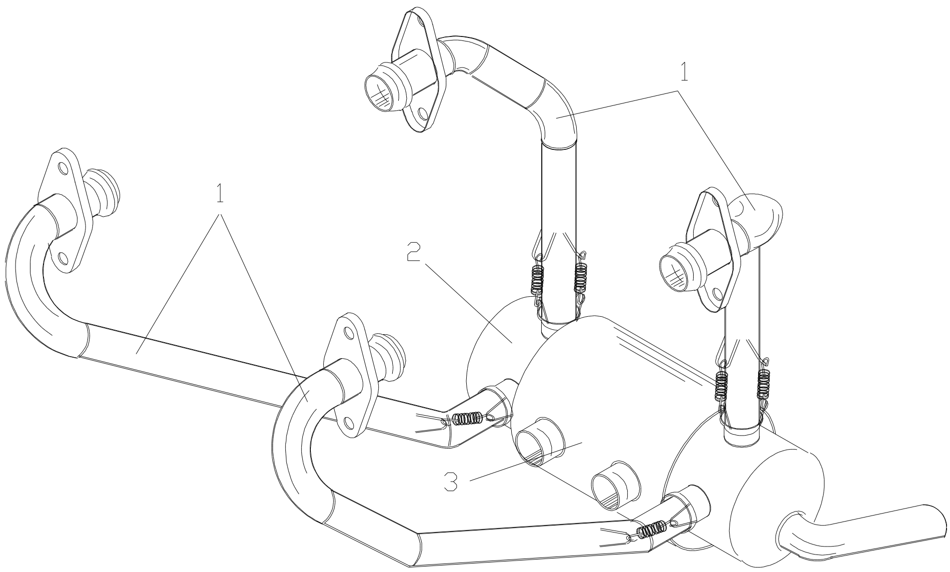


FIGURE E-7 *EXHAUST MANIFOLD*

## 5 – CARBURETTORS HEAT AND CABIN HEAT SYSTEMS

The heating system *(see Fig. E-6)* exhaust vents are:
1. Hot air vent located near the rudder pedals (1).
2. De-frost vents located in proximity of the windshield (2).

The heating system is made of: A heat exchanger (3), a hot air shut-off valve (4), and by the above mentioned exhaust outlet.
The shut-off valve is controlled by a knob located on the instrument panel.
Carburettors are fed by air provided by a ram air intake (5) and by the Airbox (6). Using the valve (7) built in the Airbox (6) it is possible to select either a cold air coming from the ram intake or by the heat exchanger. This valve is controlled by a square shaped knob located on the instrument panel.
The heat system doesn't require a specific maintenance schedule. It is only strictly recommended to check the heat exchanger condition for cracks in order

to avoid any kind of exhausted gas intrusion from the muffler into the heating system. Inspection should also recommended to the cabin hot air shut-off valve.

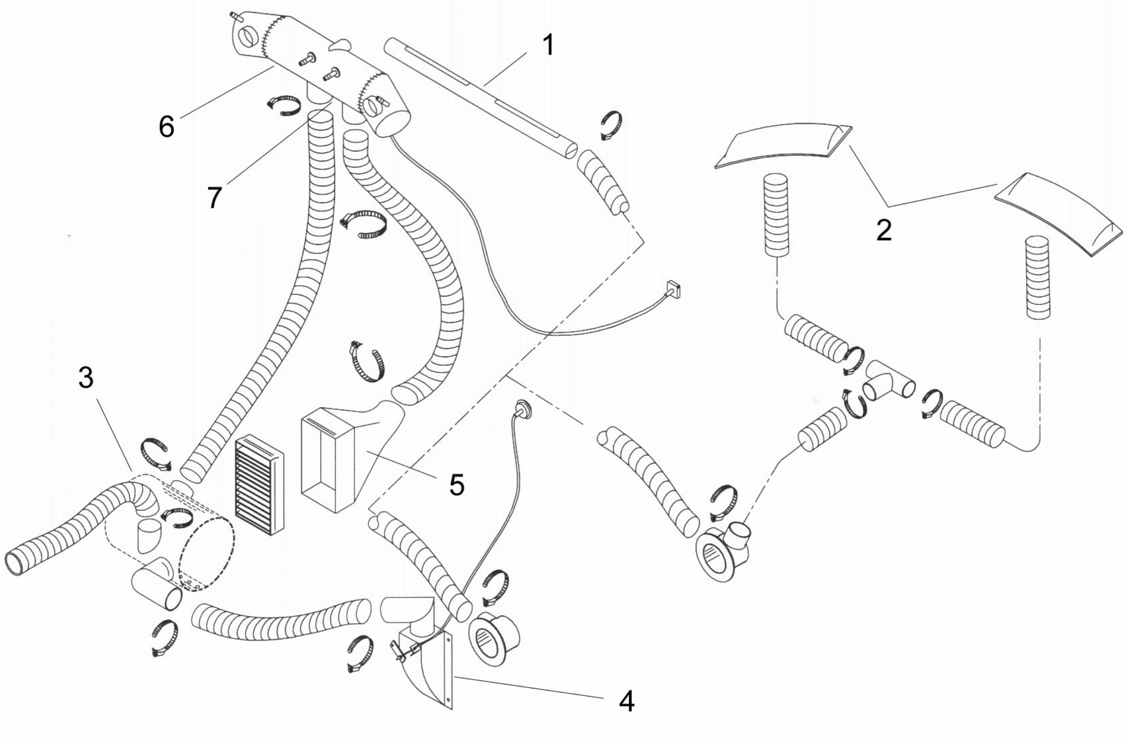


FIGURE E-8 CARBURETTOR HEAT AND CABIN HEAT SYSTEMS

## 6 - BRAKE SYSTEM

The brake system consists of a brake fluid reservoir (1), a master cylinder (2) and two disc brakes assemblies (3); an intercept valve activates parking brake (4). Braking action is through a lever (5) located on cabin tunnel between seats. Hydraulic circuit intercept valve is also located between seats and, when closed with lever pulled, keeps circuit under pressure and aircraft's parking brake on.

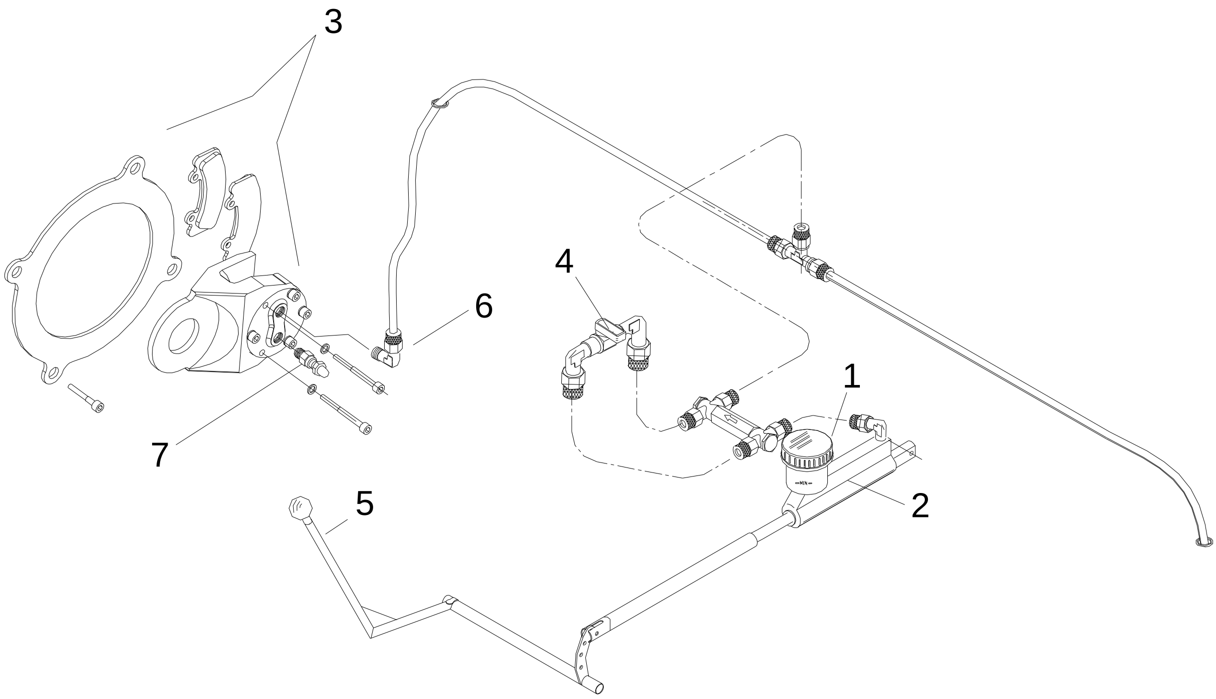


FIGURE E-9 BRAKING SYSTEM

### 6.1 - DRAINING AND REPLACING BRAKE FLUID

*To replace the brake fluid:*
Service one side first, then other;
A) Remove reservoir cap;
B) Unscrew line nipple (6) from disk caliper;
C) Using a manually operated pump, add brake fluid UNIVIS J43 until level reaches bottom of reservoir, reattach line to caliper avoiding fluid spill.

- Repeat operations A, B, C for other side.
- Top fluid level to 3/4 and close cap.

*To drain system proceed as follows:*

D) Pull brake lever (5) to pressurize circuit;
E) Loosen small escape valve (7) allowing fluid spurt;
F) Close small valve and release brake lever.

- Repeat operations D, E and F until fluid comes out clean and no longer in spurts proving absence of air bubbles.

- Top-off reservoir with needed amount of brake fluid;

- Close reservoir and repeat operation for other brake.

Hydraulic fluid may also be replaced using gravity after disconnecting the circuit. This method is however more laborious and less reliable.

## 6.2 – BRAKES LINING REPLACEMENT

When the thickness of lining is less then 2.4mm, brake pads should be replaced using the following procedure referring to the fig. E-10.

A) Make sure that the parking brake is released;
B) Remove fairings to expedite operation;
C) Unscrew bolts (1) from the caliper;
D) Remove carefully the used linings (2) parallel to the brake disk (3).
E) Replace with brand new linings and fasten them with the bolts (1) screwed to the caliper.

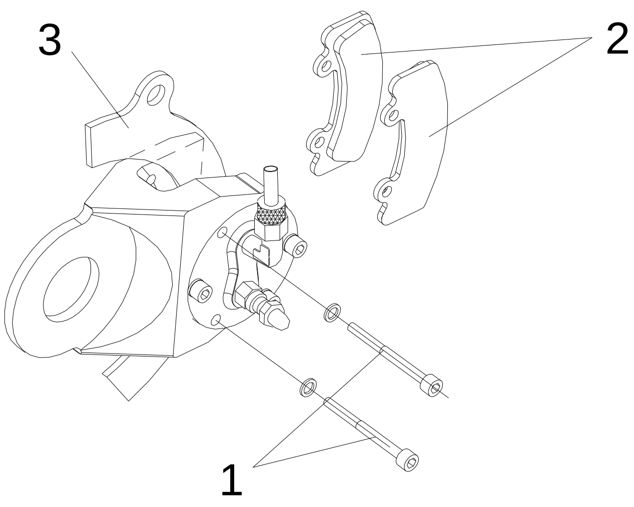


FIGURE E-10 *BRAKE ASSEMBLY*

# SECTION F

# ELECTRICAL SYSTEM

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## 1 - GENERAL

The aircraft's electrical system consists of a 12 Volt DC circuit. An 18 Ah lead battery provides the energy necessary to start the engine and acts as an emergency stand-by supply of electrical power for electrical components in case of generator malfunction.

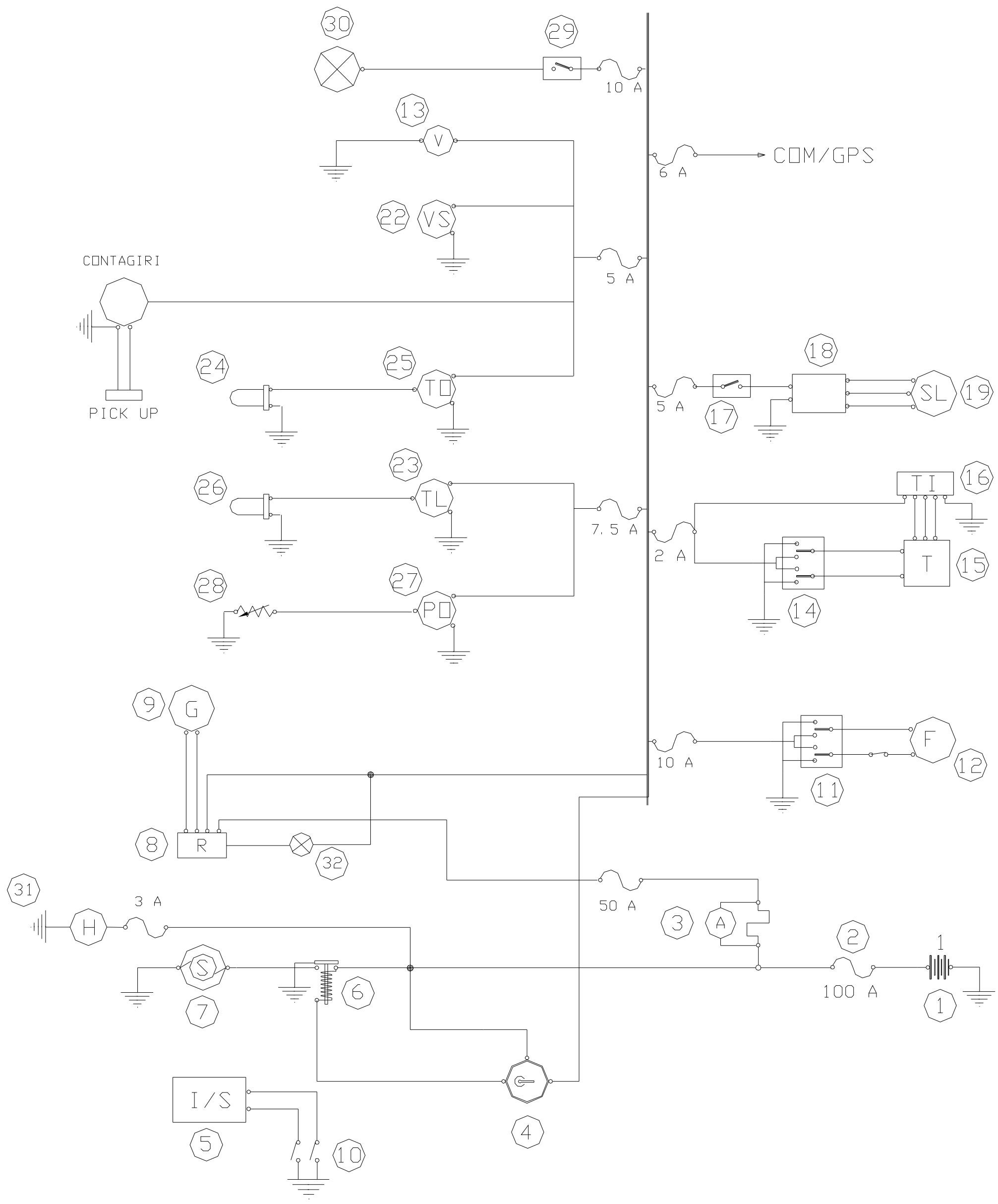


FIGURE F-1 *WIRING DIAGRAM*

A single-phase generator connected to a regulator/rectifier supplies DC power to the bus bars and to recharge the battery.

The positive end of the rectifier is connected to the primary bus through a 50 Amp circuit breaker mounted on firewall.

A red warning light on the instrument panel will turn on indicating to the pilot that the generator is not operating. Circuit protection is through breakers or fuses located on lower right side of instrument panel.
The schematic of the electrical system is shown in figure F-1.

The following table lists a legend of electrical components.

| POS. | DESCRIZIONE |
|---|---|
| 1 | Battery |
| 2 | Fuse |
| 3 | Ammeter |
| 4 | Master switch |
| 5 | Ignition systems |
| 6 | Master relay |
| 7 | Starter |
| 8 | Regulator / rectifier |
| 9 | Generator |
| 10 | Ignition switches |
| 11 | Flap switch |
| 12 | Flap's actuator |
| 13 | Voltmeter |
| 14 | Trim-tab switch |
| 15 | Trim-tab actuator |
| 16 | Trim-tab position indicator |
| 17 | Strobe light switch |
| 18 | Strobe light power supply |
| 19 | Strobe light |
| 20 | Nav lights switch |
| 21 | Nav lights |
| 22 | Turn co-ordinator |
| 23 | Water temperature indicator |
| 24 | Temperature sensor |
| 25 | Oil temperature indicator |
| 26 | Temperature sensor |
| 27 | Oil pressure indicator |
| 28 | Pressure transducer |
| 29 | Landing light switch |
| 30 | Landing light |
| 31 | Watch |
| 32 | Generator light |

## 2 - BATTERY

The battery is lead-type (model FIAMM 6H4P) and provides 12V DC current with a capacity of 0.9 A for 20 hours.

### 2.1 - BATTERY REMOVAL

If battery needs to be removed, proceed as follows:

A) Stop engine;
B) Master switch OFF;
C) Open the engine's upper cowling to get the access to the battery on the left side of the firewall;
D) First disconnect the ground cable (negative) and then the positive cable from the battery terminals;
E) Remove battery and disconnect small electrolyte drain hose.

### 2.2 - BATTERY CHECK

Battery check should be performed every 100 hours or more frequently if operating in warm climates.

A) Unscrew battery caps;
B) Use a densimeter to check the electrolyte and compare value with the following table:

| Densimeter reading | Charge |
|---|---|
| 1.280 | 100 % |
| 1.250 | 75 % |
| 1.220 | 50 % |
| 1.190 | 25 % |
| 1.160 | ***Dead battery*** |

An acceptable value should be between 1.250 and 1.280. If densimeter reading is below acceptable range, re-charge battery and check again.
If necessary, add distilled water. Do not to allow electrolyte to overflow.

### 2.3 - BATTERY INSTALLATION

A) Check the battery for traces of electrolyte and, if necessary, dry off with cloth;
B) Thoroughly clean the battery bracket area. A sodium bicarbonate solution may be used for this purpose. Also check the battery drain tube;
C) Master switch OFF;

D) First connect positive cable and then the negative to battery terminals and apply protective grease to terminals;
E) Close the engine's cowling

## 3 - GENERATOR

The generator is a permanent magnet type and supplies alternate current to a regulator/rectifier. Servicing or repair of the generator must be carried out only by authorized personnel.

## 4 - REGULATOR/RECTIFIER

A regulator/rectifier type DUCATI 965 345 is installed on the firewall within the engine compartment:

To remove it proceed as follows:

A) "Master" switch OFF;
B) Disconnect wires from terminals of component to be removed;
C) Unscrew and release component;

To install it, acts as follows:

A) Secure component in place with supplied screws;
B) Connect wires to terminals.

## 5 - EXTERIOR LIGHTING

Exterior lighting consists of:
*Navigation lights (optional)*
*Landing light (optional)*
*Strobe Light (optional)*

### 6.1 - POSITION LIGHTS (OPTIONAL)

Navigation lights are installed on the wing tips and on top of vertical stabilizer. All navigation lights are controlled by a single switch located on instrument panel and are protected by a circuit fuse.
A green light is located on right wing tip, a red light on left wing tip and a white lamp is on vertical stabilizer.
Electric schematic drawing is shown in fig. F-1

### 6.2 - LANDING LIGHT (OPTIONAL)

The landing light is located on the LH wing leading edge. Landing light switch is located on instrument panel. Light is protected by a 10 A circuit fuse.

### 6.3 - STROBE LIGHT (OPTIONAL)

The strobe light is installed on top of the vertical stabilizer.
Strobe light is activated by a switch and is protected by a fuse. Switch and breaker are positioned on the instrument panel. The signal reaches a strobe light trigger circuit box positioned in the tailcone just behind the baggage compartment and from here reaches the light.

## 6 - STALL WARNING SYSTEM *(OPTIONAL)*

The stall warning system consists of an airflow sensor and of an electric horn.
The airflow sensor is mounted on the leading edge of the RH wing.
As the aircraft approaches a stall, the sensor activates the acoustic alarm system made up of a cabin-installed horn.
In case of removal or replacement of the stall sensor, it is recommended to reinstall it so as to be effective in detecting stall condition from 1 to 3 kts before the stall speed indicated in the Flight Manual.
Never lacquer the stall warning sensor under any circumstance.

## 7 - FLAP SYSTEM

The flap system is made up of an electric actuator, a shunt and by a position indicator instrument.
The actuator is installed in the tail cone in correspondence with the baggage bulkhead and, controls a system of pushrods that initiate flap extension. Microswitches positioned within the actuator automatically interrupt current flow when flaps reach “all-out” or “all-in” positions.

A bowden-type cable issuing from the flap actuator controls flap position indicator located on the right side of the instrument panel.
Flap extension shunt is supplied by the primary bus bar through a breaker and is located on the instrument panel.
Shunt must be activated until desired position is reached and read on instrument: 0°, TO or FULL.
During flap retraction, shunt supplies the actuator until flaps are completely retracted.